**COMSATS** **University Islamabad, Lahore Campus**

**Block–C, Department of Computer Science**

**COMSATS University Islamabad, Lahore Campus, 1.5KM Defence Road, Off Raiwind Road, Lahore**

**□ Sessional-1 🗹 Sessional-II □ Terminal Examination – SPRING 2021**

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| Course Title: | Programming Fundamentals | | | | Course Code: | | CSC103 | Credit Hours: | 4(3,1) |
| Course Instructor/s: | Tahir Muhammad | | | | Programme Name: | | BSE / BCS | | |
| Semester: | 1st | Batch: | Sp21-bse-008 | Section: | C | | Date: | 5/5/2021 | |
| **Time Allowed:** | **90 Minutes** | | | | **Maximum Marks:** | | | **25** | |
| Student’s Name: | **Muhammad Talha Shafiq Choudhary** | | | | Reg. No. | Sp21-BSE-008 | | | |
| **Important Instructions / Guidelines:**   * Answer all questions. * Use proper C language syntax for coding questions. * Please put your answers into the box placed right after each question.  |  |  |  | | --- | --- | --- | | **Problem No.** | **Max. Marks** | **Obtained Marks** | | **1** | 3 |  | | **2** | 3 |  | | **3** | 2 |  | | **4** | 5 |  | | **5** | 12 |  | | **Total** | 25 |  | | | | | | | | | | |

**Q1:** Write, compile and execute the program below. Explain why the function swap does not work properly. Using pointers, change the program to make the function swap to work properly. **[3 Marks]**

**#include <stdio.h>**

**#include <stdlib.h>**

**void swap (int a, int b);**

**int main()**

**{**

**int c = 10, d = 25;**

**printf("\nBefore calling the function swap, c=%d and d=%d", c, d);**

**swap(c,d);**

**printf("\nAfter calling the function swap, c=%d and d=%d\n", c, d); return 0;**

**}**

**void swap(int a, int b)**

**{**

**int temp;**

**temp = a;**

**a = b;**

**b = temp;**

**}**

**Answer and Explain:**

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| --- |
| #include <stdio.h>  #include <stdlib.h>  void swap (int \*a, int \*b);  int main()  {  int \*c = 10, \*d = 25;  printf("\nBefore calling the function swap, c=%d and d=%d", c, d);  swap(&c,&d);  printf("\nAfter calling the function swap, c=%d and d=%d\n", c, d);  return 0;  }  void swap(int \*a, int \*b)  {  int temp;  temp = \*a;  \*a = \*b;  \*b = temp;  }    **Explanation**  In this program we use the variable a,b and temp to swap in a function so it is not possible that it can swap the value of c and d as a result it print the same value of c and d as we initialize in the main function but if we want to swap the values of c and d then then we use pointer we address the value of c and d and easily we can swap the values. |

**Q2:** Consider the following recursive function that has a positive integer number 'n' as a parameter. Assume that the parameter 'n' is a valid integer number.

**int myFunc2(int n) {**

**n /= 2;**

**n /= 2;**

**if (n <= 8) {**

**myFunc2(n/2);**

**}**

**return n%2;**

**}**

The function, 'myFunc2' will terminate i.e. the control exits the function and returns to the place from where it was called, when the value of n is \_\_\_\_\_\_\_\_\_\_\_? **[1 + 2 = 3 Marks]**

**Answer and Explain:**

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| **The value of n=36**  **Explanation**  **int myFunc2(int n) {**  **n /= 2; //n=n/2;**  **n /= 2; //n=n/2;**  **if (n <= 8) //(n>8)**  **{**  **myFunc2(n/2);**  **}**  **return n%2;**  **}**  **n=18\*2=36**  **n=9\*2=18**  **let n=9**  **we know that in this situation n is greater then 8**  **so when n=36 then myFunc terminates** |

**Q3:** Consider the following C program fragment. Assume that all necessary header files have been written. **[2 Marks]**

**void myFunc1() {**

**char c;**

**scanf(“%c”,&c);**

**if (c != 'X') { myFunc1();}**

**printf(“%c”,c);**

**return;**

**}**

**int main() {**

**printf("Give a sequence of characters: ");**

**myFunc1();**

**myFunc1();**

**return 0;**

**}**

How many times the function 'myFunc1' is called (including both the calls from the main function), if we provide the following sequence of characters as input.

abXbaaXbaaaX

**Answer:**

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| --- |
| **Number of recursive function calls: 5\_\_\_\_**  **Number of function calls in main function: \_2\_\_\_**  **Total function calls: \_\_7\_\_** |

**Q4:** Jack and Jill are novice programmers of our CSC103 class. They are asked to write a function that calculates the Tables (1 to 10) of a number and then prints its sum.

E.g. if we consider the number as 8 then the program should calculate and print the sum of (8\*1 + 8.2 + ... + 8.10) = (8 + 16 + ... + 80) **[5 Marks]**

**//main program, which calls the functions written by them**

**int main() {**

**int n;**

**printf("Enter a number \n");**

**scanf(“%d”,&n);**

**printf("%d \n”,jack(n,1));**

**printf("%d \n”,jack(jill(n,10));**

**return 0;**

**}**

**Line**

**No. // Jack's Function**

**1. int jack(int n, int i) {**

**2. if(i <= 9)**

**3. n = n\*i + jack(n, i+1);**

**7. return n;**

**8. }**

**Line**

**No. // Jill's Function**

**1. int jill(int n, int i) {**

**2. if(i != 0){**

**3. n = jill(n, i-1) + n\*i;**

**4. return n;**

**5. }**

**6. else**

**7. return n\*i;**

**8. }**

**Choose the correct option**

1. Both the functions will do as mentioned in the question
2. Only Jack's function will work correctly
3. Only Jill's function will work correctly
4. None of the functions will work correctly

**Answer and Explain:**

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| --- |
| **C:**  **Only jills function will run correctly because as i execute the code in compiler for the number enter to be 8 the jacks function return 368 while jills function return 440**  **Hence jills function is working correctely** |

**Q4:** FoodPanda delivery service wants to appraise their riders by adding increments to the basic salaries. The amount of increment depends upon the feedback points earned by the riders during food deliveries. Maximum points earned by a rider are 1000, below table explains the percentage of increment based on the points earned. Write a function calculateBonus (float, float) that receives basic salary and points earned against a rider and returns its updated salary. **[5 Marks ]**

|  |  |
| --- | --- |
| **Points Earned** | **Percentage of Increment** |
| 0-200 | 0% |
| 201-500 | 4% |
| 501- 600 | 6% |
| 601- 800 | 8% |
| 801 - 1000 | 10% |

Similarly, to analyze performance of riders, the CEO of FoodPanda wants a report of riders based on the points earned to identify best and worst and average riders. Below table explains ranking criteria for that:

|  |  |
| --- | --- |
| **Points Earned** | **Ranks** |
| 0-200 | Worst |
| 201-600 | Average |
| 601-1000 | Best |

Write a function displayReport(int arr[]) to display the report required by the CEO. To test both functions, write a main function along with an array of size 10 to store points earned by the 10 riders. **[5+2 = 7 Marks]**

**Answer:**

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