United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid-term Exam: : Trimester: Spring 2023

Course Code: CSE 1111, Course Title: STRUCTURED PROGRAMMING LANGUAGE

Time:1 hour 45 min Total Marks: 30

Answer all the questions. Figures are in the right-hand margin indicate full marks.

"Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules."

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1. (a) Which of the following are **invalid** variable names? [1]

   (i) `1UIU` (ii) `SPL_2023` (iii) `char` (iv) `SPL$` (v) `My-Course`

   (b) **Compute** the values of the variables **a, b, c** and **d**. [2]

```
int a = (float)15/4;
float b = a++*a--;
int c = (a>b || a==1+2)*2;
float d = a/c;
```

   (c) **Find the output** of the following program for (i) **b=10**, and (ii) **b=2**: [3]

```
#include <stdio.h>
int main() {
  int b;
  scanf("%d", &b);
  if(b >= 10) {
    printf("SPL\n");
    b--;
  }
  if(b < 10) {
    printf("Spring\n");
    b--;
  }
  else if((b>=3) || (b<10))
    printf("2023\n");
  else if(b>=3 && b<10)
    printf("Happy Coding!");
  else
    printf("Huh!")
  return 0;
}
```

2. (a) **Rewrite** the following code segment using "**switch … case**" without changing the logical meaning. [3]

```
int n, a;
scanf("%d %d", &n, &a);
if(n>a) {
  if(n-a>5) {
    printf("Difference is greater than 5 \n");
  }
  else {
    printf("Difference is less than or equal to 5 \n");
  }
}
else {
  printf("Please give a larger value of n \n");
}
```

(b) **Manually trace** the following code segment and show the change of values of the variables **i, j, result, x, y** in each step. [3]

```
int result = 5, i, x = 2, y = 2;
for(int j = 8; j > 3; --j) {
  i = (j * result) / x;
  result += y;
  x += (y-2);
  y++;
}
```

3. (a) **Replace** the **nested "for" loop** in the following code using **nested "do … while" loop** without changing the logical meaning of the program: [3]

```
int main() {
  int weeks = 2, days_in_week = 7;
  for (int i = 1; i <= weeks; ++i) {
    printf("Week: %d\n", i);
    for (int j = 1; j <= days_in_week; ++j) {
      if (i%2 == 0) {
        if(j%2 == 0)
          printf("    Day: %d\n", j);
      }
      else{
        if(j%2 != 0)
          printf("    Day: %d\n", j);
      }
    }
  }
  return 0;
}
```

(b) **Write a C program** that takes an integer **n** as input from the user and **prints** the following pattern using nested loop. [3]

Sample input, n	Sample output
3	2 4 6 4 6 8 10 8 6
5	2 4 6 4 6 8 10 8 6 8 10 12 14 12 10 8 10 12 14 16 18 16 14 12 10

4. (a) **Write a C program** to perform the following operations- [3]

i) **Take input** of CGPA of 100 students
ii) **Calculate the average** of the CGPA of the students who achieved more than 3.00
iii) Find out the **highest** and **lowest CGPA** and **how many students** achieved that highest CGPA.

(b) **Draw a flowchart** to calculate the **summation of the following series** up to **1000000-th** term. [3]

$$1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+\frac{1}{13}-\cdots$$

5. (a) **Manually trace** the given code segment for the following array "**arr**". Show the changes of all the variables in each step. [3]

```
#include<stdio.h>
int main()
{
  int arr[10]= {0};
  int k = 15;
  for(int i=1; i<6; i+=2)
  {
    arr[i] = ++k-2;
    k++;
  }
  int c = 0;
  for(int i=6; i<10; i++)
  {
    for(int j=10; j>=i; j--)
    {
      arr[j] = ++c;
    }
  }
  for(int i=0; i<10; i++)
  {
    if(i%2==0)
    {
      arr[i] = ++k;
    }
  }
}
```

(b) **Manually trace** the following code snippet and **find the final content** of the **2D array "arr"** after the execution of the code. [3]

```
int arr[100][100], i, j, t1 = 0, t2 = 1, t3, x, y, z;
for(i=0; i<5; i++)
{
  x = t1, y = t2, z = t1+t2;
  for(j=0; j<5; j++)
  {
    t3 = t1 + t2;
    arr[j][i] = t3;
    t1 = t2;
    t2 = t3;
  }
  t1 = y;
  t2 = z;
}
```