Bangladesh Army University of Science and Technology

Department of Computer Science and Engineering

Referred/Improvement/Backlog Examination, Fall 2018 **Level-1 Term-II**
Course No: CSE 1203 **Course Title: Structured Programming Language**
Time: 03 (Three) hours **Full Marks: 210**

N.B. (i) Answer any three questions from each PART	(ii) Use separate answer script for each PART
(iii) Marks allotted are indicated in the margin	(iv) You do not have to include header files in answer

PART A

(Answer any three questions)

1. a) What will be the output of the following code segment? State your reason. 5

```
int a=5, b=6, c=7;
c = a-b+c;
c--;
printf("%d",c);
```

b) Write a program in C to make a pyramid (check the shape below) of n lines with asterisks. (n given by user). For example, if user enters 4 as n, the pattern to be displayed is: 20

```
   *
  ***
 *****
*******
```

c) Write down a program that will take an English letter as input and will print the letter in the opposite case. For example, if the user enters D the output will be d. If the input is b the output will be B. 10

2. a) People whose Body-Mass Index (BMI) is within 18.5 to 24.9 possess the ideal amount of body weight, associated with living longest and the lowest incidence of serious illness. The formula for calculating BMI is $BMI = \frac{(Weight\ in\ kg)}{(Height\ in\ meter)^2}$ 15

Write a program that takes the *weight of a user in kilograms* and *height of a user in inches* as input (both as double). The program should produce the output as follows:

When **BMI < 18.5**, print `"You should eat more"`

When **18.5 ≤ BMI ≤ 24.9**, print `"Carry on what you are doing"`

When **BMI > 24.9**, print `"Stop eating so much!"`

*1 meter = 39.37 inches

b) What will be the output of the following code segment? 10

```
int i, j, k;
for(i=7;i<9;i++);
for(j=7;j<17;j++){
      for(k=7;k<9;j=j+5)
            k++;
      printf("%d\n",j);
}
printf("%d %d %d\n", i, j, k);
```

c) Write a program in C that prints every 4th odd number up to 1000 and then print their sum. (The series is: 7, 15, 23, ...) 10

3. a) A year, y, is called leap year if one the following conditions hold: 15

(i) y is divisible by 400.

(ii) y is divisible by 4 but not divisible by 100

Based on the above rules, write a program that takes a year from user and then prints either "Leap Year" or "Not a Leap Year".

b) Write a C program to calculate and print the sum of the following series: 10

$$4 + 8 + 16 + 32 + \ldots + 4096$$

c) A series of non-zero real numbers is given as 10

$f(1) = 1$

$f(2) = 2$

$f(3) = 3$

$f(n) = f(n - 2) + f(n-3)$, if $n>3$

So, the first 8 numbers in the series are:

1, 2, 3, 3, 5, 6, 8, 11

Write a program to calculate the sum of the first 100 numbers of this series.

4. a) Write a program that takes 1000 integers from user and prints their maximum and minimum. 10

b) Write a C program to read an N×N matrix from the console input by the User. Perform its square 15

(i.e., multiply with itself) and print the result:

Sample Execution:

```
Enter N: 3
Enter the matrix:
1 2 1
2 1 1
1 2 1
The result of multiplying it by itself is:
6 6 6
6 9 6
6 6 6
```

c) Write a function following the prototype given below: 10

```
int numcmp(int a, int b);
```

This function should

`return 0` when a equals b.

`return 1` when they are not equals.

PART B

(Answer any three questions)

5. a) Write a C program that accepts a string, counts the occurrence of the word 'the' in that string and then prints the count. For example, if the user enters: "C learners are the future of the Dept.", the count will be two since there are two 'the' in the string. 15

   b) Write a C program that takes a string from user and then reverses the string without using the strrev() function. 10

   c) Explain the two different usage scenarios of the keyword "static" with suitable codes. 10

6. a) What are the stages that a source codes goes through to become the executable? 5

   b) Write a program that stores 100 numbers from user in an array. Then sort the array in descending order and print the sorted array. 15

   c) Write a function of return type void that receives two pointers of integers as argument and swaps the contents of the locations referred by the pointers. 15

7. a) A student management system records information of all students. The record has the following fields: 10 + 15 + 10

Fields	Description
name	Name of the student
stdID	Student ID
enrolDate	Date of admission into the university
GPA	An array containing 8 semesters' GPA

   i) Write down a suitable structure to store the above mentioned information of all students.

   ii) Suppose the information of 50 such students are stored in a binary file at D:\stddata.dat. Write down a C program to display the information (name and stdID) of all the students whose CGPA is less than 3.0. You may assume that the CGPA is the average of the GPAs. (Hint: you have to calculate the CGPA using GPA's of 8 semesters).

   iii) Display the name and ID of the student who got the highest CGPA.

8. a) What is dynamic memory allocation? When is it needed? 6

   b) What is bit-field? When is it useful? Explain with an example. 9

   c) Write the output of the following code segment. 8

```
#include <stdio.h>
enum day {sun = 10, mon, tue = 2, wed, thu = 9, fri, sat};
int main()
{
    printf("%d %d %d %d", mon, wed, fri, sat);
}
```

   d) Write the output of the following program. 12

```
int main()
{
    int p[5]={4,3,2,1,0},z,*y,**x;
    x=&y;
    y=p;
    fun(p);
    printf("%d %d %d %d %d", p, p[0], *(p+2), **x,*(*x+1));
}
```

```
void fun( int *temp)
{
    *temp = 77;
    return;
}
```