Complete within two working days Date: 15/03/22

Assignment 05

Second Year BS (Honours) 2020-21

Course Title: Math Lab II (Fortran), Course Code: AMTH 250

Department of Applied Mathematics, University of Dhaka

Name: **Roll No:** **Group:**

[Write a FORTRAN program to solve each of the following problems. ***Use files for input/output unless specified otherwise****. Name the files and the code according to the assignment and problem no., e.g., for problem no.* ***Y*** *of assignment* ***X****, input & output file names must be 'in****X****q****Y****.txt' and 'out****X****q****Y****.txt' respectively.]*

	Day-1	
1.	The Lucas numbers may be defined recursively by $L_0 = 2,\ L_1 = 1$ and $L_n = L_{n-1} + L_{n-2}$ for $n = 2,3,4,\ldots.$ Generate the first *12* Lucas numbers and print them in the following tabular form n: 0 1 2 3 4 5 6 7 L_n: 2 1 3 4 7 11 18 29	**[10]**
2.	Determine $P(n,r)$ and $C(n,r)$, where *n* and *r* are nonnegative integers. Use recursive function as a subprogram to calculate the required factorial value.	**[10]**
3.	Let H_n denote the number of moves needed to solve the Tower of Hanoi problem with *n* disks. The recurrence relation with the initial condition is given by $H_n = 2H_{n-1} + 1,\ H_1 = 1.$ Use recursive function as a subprogram to determine the number of moves required if $n = 25.$ If each move takes *1* second, how many days required to move *25* disks from peg *1* to peg *2*?	**[10]**

	Day-2	
4.	The number of bit strings of length n that do not have two consecutive *0s* may be represented by the recurrence relation $S_n = S_{n-1} + S_{n-2}$ for $n \geq 3$, and initial conditions $S_1 = 2$ and $S_2 = 3$. Write a Fortran program to determine how many such bit strings are there for $n = 1, 2, \ldots, 20$?	**[10]**
5.	Generate all the possible bit strings of length *n*. Also, print them in ascending order.	**[10]**

6.	Write a Fortran program to construct a truth table for $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$. Also, show that they are logically equivalent.	**[15]**