NEPAL COLLEGE OF INFORMATION TECHNOLOGY
MFCS_ASSIGNMENMENT_2

Level: Bachelor   Semester – Spring   Year: 2020
Programme: BEIT (2nd semester)   Time: 1 week
Course: Mathematical Foundation of Computer Science

Students are required to give their answers in their own words as far as practicable.

1. Solve The following recurrence relation:
   a. $a_n = 5a_{n-1} - 6a_{n-2}$ with initial condition $a_0 = 1$ and $a_1 = 0$.
   b. $a_n = 4a_{n-1} - 4a_{n-2}$ with initial condition $a_0 = 6$ and $a_1 = 8$.
   c. $a_n = 7a_{n-2} + 6a_{n-3}$ with initial condition $a_0 = 9, a_1 = 10$, $a_2 = 32$.
   d. $a_n - a_{n-1} - a_{n-2} = 0$.

2. Solve The following recurrence relation:
   a. $a_n = 3a_{n-1} + 2^n$ with initial condition $a_0 = 5$
   b. $a_n = 2a_{n-1} + 2^n$ with initial condition $a_0 = 2$
   c. $a_n = 7a_{n-1} - 10a_{n-2} + 16n$
   d. $a_n = 2a_{n-1} + 2n^2$ with initial condition $a_1 = 4$
   e. $a_n = 5a_{n-1} + 6a_{n-2} + 2^n$ with initial condition $a_0 = 1$, $a_1 = 4$
   f. $a_n = 5a_{n-1} - 6a_{n-2} + 3n + 2^n$ with initial condition $a_0 = 0$, $a_1 = 1$, $a_2 = 2$
   g. $a_n = 7a_{n-1} + 16a_{n-2} + 12a_{n-3} + n4^n$ with initial condition $a_0 = -2$ $a_1 = 0$, $a_2 = 5$
   h. $a_n - 6a_{n-1} + 8a_{n-2} = 3$ with initial condition $a_0 = 10$, $a_1 = 25$

3. What do you understand by recurrence relation? Explain in brief. Setup a recurrence relation for the sequence representing the number of moves needed to solves Hanoi Tower puzzle.
4. Find the explicit formula for Fibonacci sequence.
5. An office buys a computer system for $6,900. It is to be depreciated using reducing balance depreciation at the rate of 7% per annum.
   a) Write down a recurrence relation which would model the value of the system after n years.
   b) Use your recurrence relation to determine the value of the system after 1, 2 and 3 years.
   c) What was the depreciation during the third year?