SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

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Tutorial-8 (CO_I)
Subject Name: Discrete Mathematics
B.Tech._AIML_SEM-IV_2023-27 (AY-2024-25)

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Q.1 Find the solution of the following recurrence relations.

(i) $a_n = 5a_{n-1}; a_0 = 1$

(ii). $y_{n+2} - 4y_{n+1} + 3y_n = 2^n;\ n \geq 0$

(iii) $a_{n+1} - 3a_n = (n^2 + 1); n \geq 1; a_0 = 1.$

(iv). $a_{n+2} - 6a_{n+1} + 9a_n = 3(2^n) + 7(3^n), n \geq 0$

(vi). $a_n - 5a_{n-1} + 6a_n = 3^n + 2n; n \geq 0$

(vii). $y_{n+2} - 4y_{n+1} + 4y_n = 2n\ (4)^n;\ n \geq 0, y_0 = 0, y_1 = 1.$

Some Application based Problems

Q.2 Model the rabbit growth model (a type of population growth model) by using recurrence relation. Also find the solution of the same to calculate the populations of the rabbits after n-unit of time. Consider the following rules for it.

- young pair of rabbits (one of each sex) is placed on an island. A pair of rabbits does not breed until they are 2 months old. After they are 2 months old, each pair of rabbits produces another pair each month.

- Find a recurrence relation for the number of pairs of rabbits on the island after *n* months, assuming that no rabbits ever die.

Q.3 Do the modelling of the **Tower of Hanoi game** in terms of recurrence relation. Also find the solution of it.

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