



(An Autonomous Institution) Coimbatore-641035.

UNIT 2- COMBINATORICS

Recurrence Relation

Recurrence Relation Let Eany be a sequence of neal numbers with an as the nth tourn. A recurrence relation of the sequence {any is an equation that expresses antonins of one or more cariller terms ie, a, a2, -- an-1 for all entegers n wash nzno Eg: f960nacc9 soules: 0,1,1,2,3,5,8,13... which can be nepresented by the necuvorence nelation $f_n = f_{n-1} + f_{n-2}$, $n \ge 2$ whith $f_0 = 0$, $f_1 = 1$ Homogeneous Recipiance Relation A lanear homogeneous recurrence relation of degree K with constant coefficients is a mecuronence nelation of the form, an= c, an-1+ ca an-a+ ... +ckan-k' where c_1, c_2, \dots, c_K one real numbers and $c_K \neq 0$. Solution of Anead homogeneous removence Helateon worth constant coefficient the solution se of the form yn = Homogeneous Soln. + Partiquian solz. ie., yn = HS + PS Rules to tand HS: 1. WHITE the character ister eqn. 2. Solve and trad the 9100ts H5 Roots I do, da vie distance Adi+ Both a) on, one orde equal (A+nB) on 到, α1=α+iβ% i). A(α+iβ)"+ B(α-iβ)" ii). 8 (A cosno+8 39n no) ora = a-iB where of = Jat pa d t i B $\theta = \tan^{-1}(\beta/\alpha)$



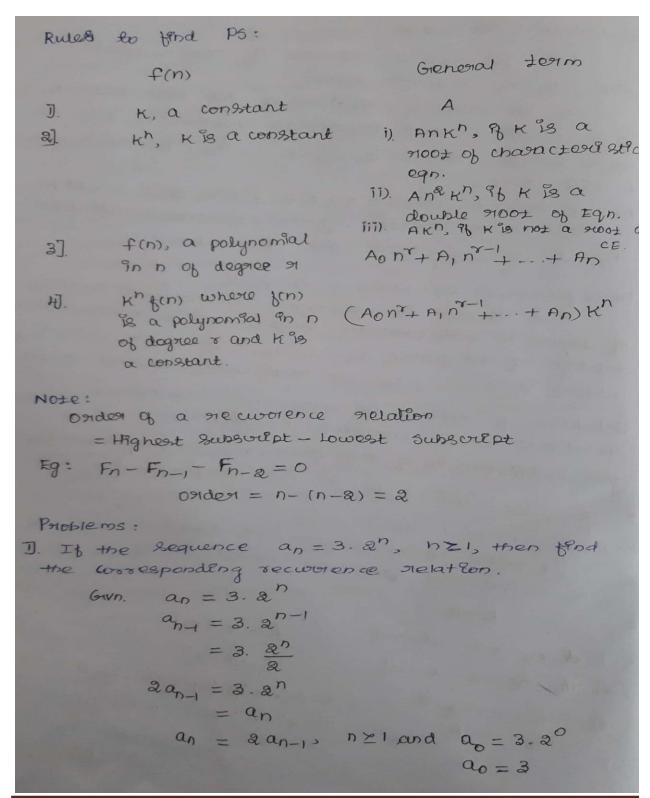


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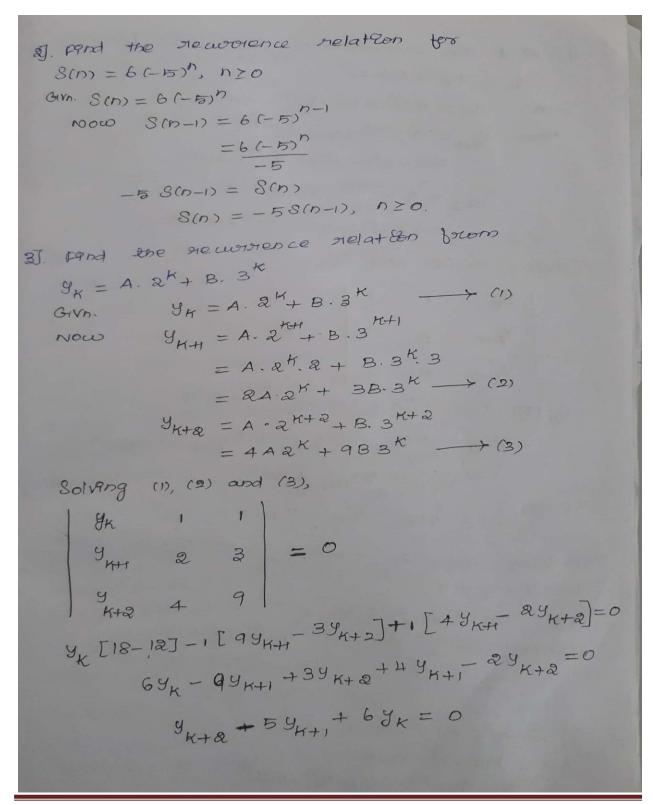




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4. Find the securotence nelation brown

$$y_n = A3^n + B(-2)^n$$

Given. $y_n = A3^n + B(-2)^n \longrightarrow (1)$

Now, $y_{n+1} = A3^{n+1} + B(-2)^{n+1}$
 $= 3A3^n - 2B(-2)^n \longrightarrow (2)$
 $y_{n+2} = A3^{n+2} + B(-2)^{n+2}$
 $= 9A3^n + AB(-2)^n \longrightarrow (3)$

Solveng (1), (2) and (3),

 $y_n = y_{n+2} = 0$
 $y_{n+2} = y_{n+2} + y_{n+2} + y_{n+2} = 0$
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