CS-206

ASSIGNMENT - 10

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Que 1:

$a_n = 3a_{n-1} + 2^n$

a) if $a_n = -2^{n+1}$ is it a solution?

$a_{n-1} = -2^n$

$\therefore \; (-2^{n+1}) = 3(-2^n) + 2^n$

$-2^{n+1} = -2^{n+1}$

Hence $a_n = -2^{n+1}$ is a solution

b) Roots characteristic equation

Let $a_n = r$ and $a_{n-1} = 1$ (other function of n are considered to be "0")

$\therefore$ from the given relation

$\boxed{r = 3}$

The solution of recurrence relation is of the form

$a_n = \alpha_1 r_1^n + \alpha_2 n r_1^n + \alpha_3 n^2 r_1^n \;----\; + \alpha_k n^{k-1} r_1^n$

with r_1 a root of multiplicity k of the ch. equation.

$a_n^{(h)} = \alpha . 3^n$

Thus the sol. of homogeneous recurrence relation is $a_n^{(h)} = \alpha . 3^n$

Now; solution of non-homogeneous linear recurrence relation is sum of homogenous $a_n^{(h)}$ and particular solution $a_n^{(p)}$

$$a_n = a_n^{(h)} + a_n^{(p)}$$

$$= \alpha \cdot 3^n - 2^{n+1}$$

$\therefore$ Ans $\boxed{a_n = \alpha \cdot 3^n - 2^{n+1}}$

(c) $a_0 = 1$

$a_n = \alpha \cdot 3^n - 2^{n+1}$

$a_0 = \alpha \cdot 3^0 - 2^1$

$1 = \alpha - 2$

$\boxed{\alpha = 3}$

Ans $\Rightarrow$ $\boxed{a_n = 3^{n+1} - 2^{n+1}}$

Que 2:- Recurrence relation :- $a_n = 8a_{n-2} - 16a_{n-4} + f(n)$ $[n \geq 4$

Root ch equation

$a_n = r^4$. $a_{n-1} = r^3$ $a_{n-2} = r^2$ $a_{n-3} = r$ $a_{n-4} = 1$

$\therefore r^4 = 8r^2 - 16$

$\therefore (r-2)^2 (r+2)^2 = 0$

$r = -2$ with multiplicity 2

$r = 2$ with multiplicity 2

$\therefore a_n = \alpha_1 (-2)^n + \alpha_2 \cdot n(-2)^n + \alpha_3 (2)^n + \alpha_4 \cdot n(2)^n$

Particular solution

if $F(n) = (b_t n^t + b_{t-1} n^{t-1} - - - + b_0) s^n$ and S is

(i) not the root of characteristic eq. then.

$(P_t n^t + P_{t-1} n^{t-1} + -- + P_0) s^n$ is the particular sol.

(ii) if S is root of characteristic eq then.

$n^m (P_t n^t + P_{t-1} n^{t-1} + -- + P_0) s^n$ is the particular sol.

where m is multiplicity of s

a) Since 2 is root of ch eq. with multiplicity 2.

Particular sol.

$$a_n^{(P)} = n^2 (P_4 n^4 + P_3 n^3 + P_2 n^2 + P_1 n + P) 2^n$$

b) Since -2 is root with multiplicity 2

$$a_n^{(P)} = n^2 (P_2 n^2 + P_1 n + P_0)(-2)^n .$$

Ques:

(a) Yes, it is isomorphic

(b) Euler circuit exsists.

aihgdef gcehd cabicbha.

(c) No, hamilton circuit exsist, because once the circuit reaches e, it will have no place to go.

Qu 4: (a) (i) $\boxed{80}$ = Camden $\xrightarrow{60}$ wood bridge $\xrightarrow{20}$ Newark

(ii) $\boxed{165}$ = Cape May $\xrightarrow{85}$ Camden $\xrightarrow{60}$ wood bridge $\xrightarrow{20}$ Newark

(b) (i) \$ 0.6 ⇒ Camden $\xrightarrow{0}$ woodbridge $\xrightarrow{0.6}$ Newark.

\$ 0.6 ⇒ Cape May $\xrightarrow{0}$ Camden $\xrightarrow{0}$ woodbridge $\xrightarrow{0.6}$ Newark.