Days Period	Class Subject	Class Work Forecast ..... to	Home Work
		Class B.Tech (E.C.E) 2nd yr Sub: Signal & System. Faculty: Mandeep Singh Date: 30/4/2020.	
		Topic: Numerical based on Parseval Theorem.	
	Q.1.	Verify Parseval Theorem for sequence. $x(n) = \left(\frac{1}{2}\right)^n \cdot u(n)$.	
	Sol:	Acc. to Parseval Theorem. $\sum_{n=0}^{N-1} \lvert x(n)\rvert^2 = \frac{1}{N} \sum^{N-1} \lvert X(k)\rvert^2 \quad \text{---(1)}$	

Remarks :

Planning for ..... to .....

Days Period	Class Subject	Class Work Forecast	Home Work

Step 1 :- Consider value of N = 4 that means

$n = 0$ to $N-1$

$\therefore n = 0$ to 3

For $n = 0 \Rightarrow$ $x(0) = \left(\frac{1}{2}\right)^0 = 1$

$n = 1 \Rightarrow$ $x(1) = \left(\frac{1}{2}\right)^1 = \frac{1}{2}$

$n = 2 \Rightarrow$ $x(2) = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$

$n = 3$ $x(3) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

Marks : _____

Class
Subject

Home Work

$$x(n) = \left\{ \underset{\uparrow}{1}, \frac{1}{2}, \frac{1}{4}, \frac{1}{8} \right\}$$

Step-III :- Consider L.H.S. of eq (1)

$$L.H.S. = \sum_{n=0}^{N-1} |x(n)|^2$$

$$= \sum_{n=0}^{3} |x(n)|^2$$

$$L.H.S. = |x(0)|^2 + |x(1)|^2 + |x(2)|^2 + |x(3)|^2$$

$$\therefore L.H.S. = 1 + \left(\frac{1}{2}\right)^2 + \left(\frac{1}{4}\right)^2 + \left(\frac{1}{8}\right)^2$$

$$L.H.S. = 1.3281 25$$

Period	Subject	Class Work Forecast	Home Work

Step-III Consider R.H.S. term.

$$R.H.S. = \frac{1}{N} \sum_{k=0}^{N-1} |X(k)|^2$$

First we will calculate DFT $X(k)$ using Matrix method.

$$X(k) = [W_4] \cdot X_N$$

$$\therefore \begin{bmatrix} X(0) \\ X(1) \\ X(2) \\ X(3) \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -j & -1 & j \\ 1 & -1 & 1 & -1 \\ 1 & j & -1 & j \end{bmatrix} \begin{bmatrix} 1 \\ \frac{1}{2} \\ \frac{1}{4} \\ \frac{1}{8} \end{bmatrix}$$

Class Work Forecast

Home Wor

$$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$$

$$= 1 - \frac{1}{2} - \frac{1}{4} + \frac{j}{3}$$

$$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8}$$

$$1 + \frac{j}{2} - \frac{1}{4} + \frac{j}{8}$$

$$= 1.875$$

$$0.75 - j\,0.375$$

$$0.625$$

$$0.75 + j\,0.375$$

Planning for ..... to .....

Days Period	Class Subject	Class Work Forecast	Home Work
	∴	$X(k) = \{1.875,\ 0.75 - j0.375,$	
		$0.625,\ 0.75 + j0.375\}$	
		Now we are calculate $X(k)$	
	∴	$\|X(k)\| = \{1.875,\ 0.838525,$	
		$0.625,\ 0.838525\}$	

Days / Period	Class Subject	Class Work Forecast	Home Work
Q. 1.		Why the result of circular and linear convolution is not same	
Ans:		circular convolution contains same number of samples as that of $x(n)$ and $h(n)$, while in linear convolutions, number of samples in the results (N) are:	
		$N = L+m-1$	
		L = Number of samples in $x(n)$	
Ord		M = Number of samples in $h(n)$.	
That is why the result of linear and circular convolutions is not same.			