Dr. Mahalingam College of Engineering and Technology, Pollachi-3
(An Autonomous Institution affiliated to Anna University)

RETEST (2016 Regulation)

Name of Programme: **B.E - EEE**

Course Code & Course Title: **16EET44 – Networks and Signals**

Sem: IV   Date & Session: 09.04.2018   Duration: 1½ hours   Max. Marks: 50

Part- A   Objective Questions   (10X1=10 Marks)

Q. No	Question	CO No	Blooms Level
1	c) Multiplication	CO1	R
2	b) (8/3) Ω	CO1	U
3	c) on jω axis	CO2	R
4	a) pole at ω= 0	CO2	U
5	True	CO3	R
6	Band stop fliter	CO3	U
7	b) Convolution	CO4	U
8	a) y[n] = x[n-k]	CO4	U
9	b) data on a CD	CO4	U
10	d) Integration	CO4	U

Part- B   Short Answer Questions   (5X2=10 Marks)

Q. No	Question	CO No	Blooms Level
11	List the uses of lattice network? ➢ Lattice networks are used in filter sections and are also used as attenuators filter and attenuators. ➢ Lattice structures are sometimes used in preference to ladder structures in some special applications.	CO1	R
12	List the properties of RL Driving point function. ➢ The Poles and Zeros of the RL driving point impedance function are located on the negative real axis of the s-plane. ➢ Poles and zeros alternate along the negative real axis ➢ The singularity at the origin or s=0 is a zero ➢ The singularity at s=∞ is a pole ➢ The slope of the impedance curve is positive ➢ The impedance at s=∞ is always greater than the impedance at ω = 0 ➢ The residues at the poles of Z(s) are real and negative. The residues of Z(s)/s are real and positive	CO2	R
13	Check whether Z(s) = (S+3)/(S+2) is a positive real function. 1. Function Z(s) has poles at s=-2 and zero at s=-3. Thus the pole and zero are in the left half of the s plane 2. There is no pole on the jω axis, hence residue test is not carried out 3. $A(\omega^2) = m_1m_2 - n_1n_2/s=j\omega$ = 3X1 – sXs/ s=jω $=3+\omega^2$ $A(\omega^2)\geq 0$ for all ω**Since all the conditions are satisfied. The function is positive real function**	CO2	U
14	Find the frequency at which prototype π-section low pass filter having a cut-off frequency fc has an attenuation of 20dB. α = 20*0.1151=2.23 Neper	CO3	U

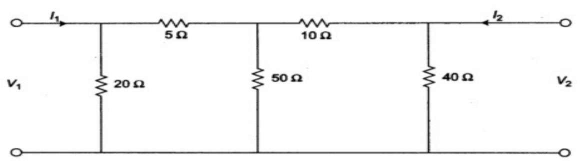
	$\alpha = COSh^{-1}(f/fc)$ f= 1.689 fc		
15	Find the auto correlation of x(n)={1 2 1}	CO4	U

x(n)	x(-n)		
	1	2	1
1	1	2	1
2	2	4	2
1	1	2	1

$\gamma_{xx}(n) = \{1,4,6,4,1\}$
$\uparrow$

Part- C Descriptive – either or questions (2X15=30 Marks)

Q. No	Question	CO No	Blooms Level
16. (a)	Find the Y Parameters of the network shown in figure.	CO1	Ap



a) port 2-2' is sc, $V_2=0$

$Y_{11} = \frac{I_1}{V_1}\Big|_{V_2=0}$

$V_1 = I_1 Y_{eq}$

$Y_{eq} = \left(\frac{50\times10}{50+10}+5\right)||20$

$Y_{eq} = 8$

$V_1 = 8I_1$

$Y_{11} = \frac{I_1}{8I_1} = \frac{1}{8}\ \mho$

$Y_{21} = \frac{I_2}{V_1}\Big|_{V_2=0}$

$-I_2 = I_1 \times \frac{50}{65} = \frac{50}{65}\times\frac{V_1}{8}$

$-I_2 = 0.096\,V_1$

$Y_{21} = \frac{-0.096V_1}{V_1} = -0.096$

b) port 1-1' is sc, $V_1=0$

$Y_{22} = \frac{I_2}{V_2}\Big|_{V_1=0}$

$V_2 = I_2 Y_{eq}$

$Y_{eq} = \left\{\frac{5\times50}{5+50}+10\right\}||40$

$Y_{eq} = 10.66$, $V_2 = I_2(10.66)$

$Y_{22} = \frac{I_2}{10.66\,I_2} = 0.094\ \mho$

$Y_{12} = \frac{I_1}{V_2}\Big|_{V_1=0}$

$-I_1 = I_2\times\frac{50}{65}$

$= \frac{50}{65}\times\frac{V_2}{10.66}$

$-I_1 = 0.07V_2$

$Y_{12} = \frac{-0.07V_2}{V_2}$

$Y_{12} = -0.07$

OR

16. (b)	The driving point impedance of an network is given by $$Z(S) = \frac{10S^4+12S^2+1}{2S(S^2+1)}$$ Obtain first and second Cauer form.	CO2	Ap

First Cauer Form: (7.5 M)

$2s^3+2s)\,10s^4+12s^2+1\,(5s$

$\underline{10s^4+10s^2}$

$2s^2+1)\,2s^3+2s\,(s$

$\underline{2s^3+s}$

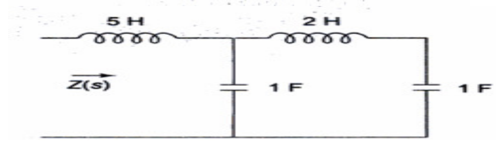
$s)\,2s^2+1\,(2s$

$\underline{2s^2}$

$1)\,s\,(s$

$\underline{s}$

0



Second Cauer Form: (7.5M)

$2s+2s^3)\,1+12s^2+10s^4\,(\frac{1}{2s}$

$\underline{1+s^2}$

$11s^2+10s^4)\,2s+2s^3\,(\frac{2}{11s}$

$\underline{2s+\frac{20s^3}{11}}$

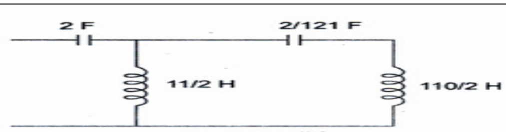
$\frac{2s^3}{11})\,11s^2+10s^4\,(\frac{121}{2s}$

$\underline{11s^2}$

$10s^4)\,\frac{2}{11}s^3\,(\frac{2}{110s}$

$\underline{\frac{2}{11}s^3}$

0



17. (a) Design an m derived low pass filter(T and π Section) if it has a design resistance of 650Ω with a cut off frequency of 1500Hz with infinite attenuation frequency of 2000Hz. — CO3 — Ap

Design of L and C (5 Marks)

For low pass filter, L= $\frac{K}{\pi f_c}$ **= 0.138H** C = $\frac{1}{\pi k f_c}$ **= 0.327μF**

Design of m: (2 Marks) m = $\sqrt{1-\left(\frac{f_c}{f_\infty}\right)^2}$ = 0.66

Elements of modified low pass filter: (4 Marks)

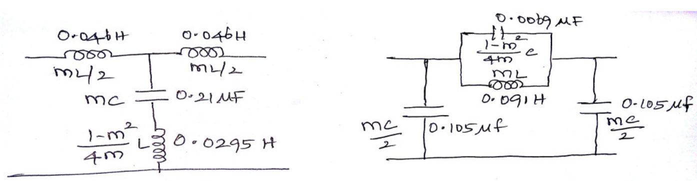
T section Elements are, mL/2 = 0.046H ,

mC = 0.21 μF ,(1-m²/4m)L =0.0295H

π section Elements are, mC/2 = 0.105 μF ,

mL = 0.091H ,(1-m²/4m)C =0.0069 μF

m derived LP filter diagram: (4 Marks)



OR

17. (b) Find the linear convolution of the following using graphical and tabulation method. x(n)={1 2 3 4};h(n)={ 1,4,2,1} — CO4 — Ap

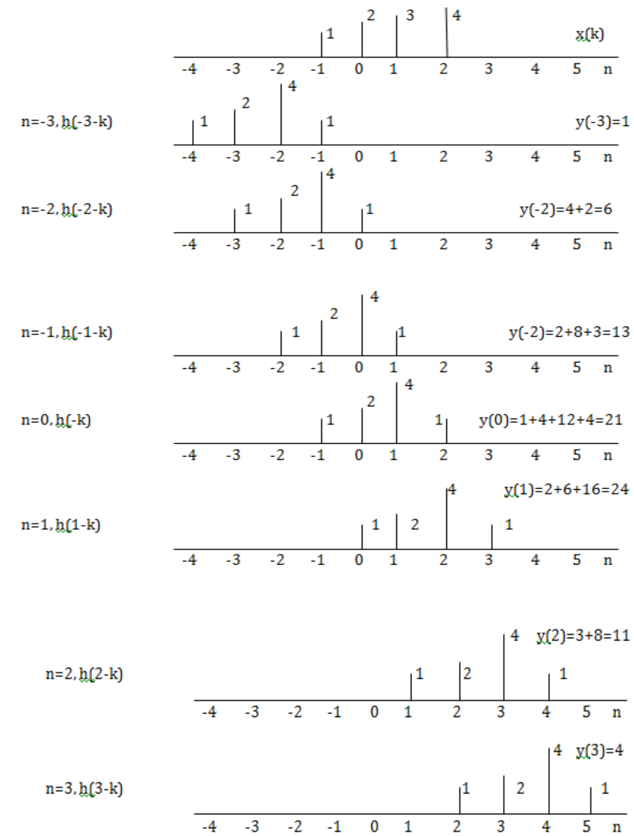
i) Graphical Method: (7.5 M)

x(n) starts at n=-1, h(n) starts at n=-2,

Output y(n) starts at n=-1-2=-3

No. of samples in y(n) = N1+N2-1=4+4-1=7 Samples

$$y(n) = \sum_{k=-\infty}^{\infty} x(k)h(n-k)$$



y(n) = {1,6,13,21,24,11,4}
↑

ii) Tabulation Method: (5 M)

k		-4	-3	-2	-1	0	1	2	3	4	5
x(k)					1	2	3	4			
n=-3	h(-3-k)	1	2	4	1						
n=-2	h(-2-k)		1	2	4	1					
n=-1	h(-1-k)			1	2	4	1				
n=0	h(-k)				1	2	4	1			
n=1	h(1-k)					1	2	4	1		
n=2	h(2-k)						1	2	4	1	
n=3	h(3-k)							1	2	4	1

y(n) = {1,6,13,21,24,11,4}
↑