Total No. of Printed Pages:2

SUBJECT CODE NO:- E-284
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(EEE/EEP/EE) Examination Nov/Dec 2017
Digital Signal Processing
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Solve Any three questions from each section.
2) Assume suitable data wherever necessary.

Section A

Q.1 Solve.

1) Define power and energy signals. 03
2) State properties of discrete time sinusoids. 03
3) Define quantization noise and resolution. 03
4) What is minimum sampling frequency of $x(t) = 4\cos 100\pi\, t$ to avoid aliasing. 01
5) State properties of convolution. 03

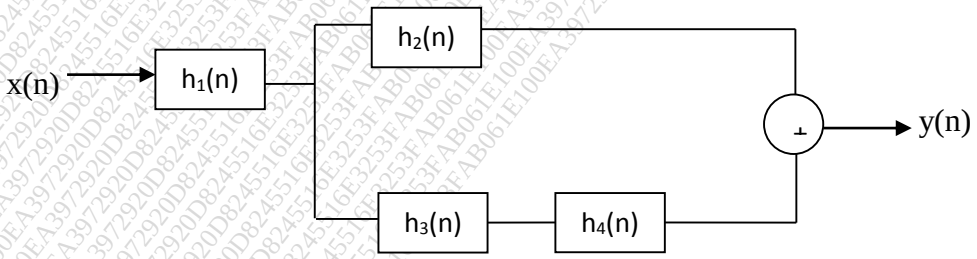
Q.2
a) Perform the following operation on $x(n) = \{1,2,3,4,5,4,3,2,1\}$ that time scaling by 2 and ½. 06
b) Determine the response of following system to the input signal $x(n) = |n| \quad -3 \le n \le$ 07
$= 0$ otherwise

i) Moving average filter
ii) Accumulator.

Q.3
a) Compute convolution. $y(n) = x(n) * h(n)$ of following signals. $x(n) = \{0,1,4,-3\}$ 06
$\uparrow$

and $h(n) = \{1,0,-1,-1\}$
$\uparrow$

b) Consider the interconnection of LTI system as shown in fig.



a) Express the overall impulse response in terms of $h_1(n), h_2(n), h_3(n) and\ \ h_4(n)$. 01
b) Determine $h(n)$, when- 06
$h_1(n) = \{1,2,1\}$
$h_2(n) = \{1,1,2\}$
$h_3(n) = \{2,1,1\}$
$h_4(n) = \{2,2,1\}$

Q.4 a) Draw and explain block-diagram of Digital signal processing. 06
b) State and explain three characterizing properties of 'Discrete Time signals' 07

Q.5 Write short note on- (any two) 14
1) Classification of systems
2) Correlation
3) Advantages of digital over analog signal processing.

Section B

Q.6 Solve-
a) When the DFT x(k) of a sequence x(n) is real and when it is imaginary? 03
b) Differentiate between linear and circular convolution. 03
c) What is the order of filter if 01

$$y(n) = \sum_{K=0}^{N-1} x(k)h\,(n-k)$$

d) What is the ROC of infinite anticausal signals. 01
e) State what is twiddle factor & what is its importance. 03
f) What is meant by pole and zero. 02

Q.7 a) Find L_1 – point DFT of $x(n) = \{1, -2, 3, 4\}$ 06
b) Determine IDFT of $x(k) = \{1, -2, -j, 0, -2 + j\}$ 07

Q.8 a) Determine the inverse Z- transform of $x(z) = \frac{z^2}{0.5 - 1.5z + z^2}$ for ROC $|z| < 0.5$ using long division method. 07
b) Compute convolution $x(n)$ of the signals. $x_1(n) = \{1, -2, 1\}, x_2(n) = 1 \quad 0 \le n \le 5$ $= 0$ elsewhere 06

Q.9 a) Establish relation between DFT and z-transform. 06
b) State properties of DFT. Prove at least three properties in detail. 07

Q.10 Write short note on. (any two) 14
1) Inverse Z-transform by partial fraction method.
2) FIR. Filter structures.
3) Signal flow graphs.