Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCBM 4302

Fifth Semester (Special) Examination – 2013

SIGNALS AND SYSTEMS

BRANCH : AEIE, BIOMED, CSE, EC, ETC, IEE, IT

QUESTION CODE : D 315

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) Define convolution of two signals. Write the expression for convolution expression of two discrete signals.

   (b) What is causal signal and causal system ?

   (c) Find the circular convolution of the signal

   $X(n)=\{1,-i, 1,-1\}$ and $Y(n) = \{1,0\ 1,i\}$

   (d) What is BIBO stability and write the condition for LTI system ?

   (e) State and derive the time reversal property of z-transform.

   (f) State the interconnection of discrete time system.

   (g) What is twiddle factor ?

   (h) State initial value theorem and final value theorem.

   (i) State complex conjugate property of DFT.

   (j) $y(n)= -n$ is a causal signal or not ? Justify.

P.T.O.

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   (j) $y(n)=-n$ is a causal signal or not ? Justify.

P.T.O.

2. (a) Find the inverse z transform of

$X(z)=1/(1-1.2z^{-1}+0.2z^{-2})$ if ROC : $0.2<|z|<1$ 5

(b) Explain the realization of LTI system by direct form 1 and direct form 2 with example. 5

3. (a) Determine the impulse response of the system described by the difference equation

$y(n)=0.6(n-1)-0.08Y(n-2)+x(n)$. 5

(b) Prove that $r_{yx}(k)=h(-k)*r_{xx}(k)$ where $r_{yx}(k)$=cross correlation of output and input signal,

h(k) = impulse response of LTI system and $r_{xx}(k)$= autocorrelation of input signal. 5

4. (a) Compute the output of the system having impulse response h(n)={1,i+2, −1,0,−1} for the input

x(n)={1,0,1}. 5

(b) What is normalized cross correlation and what is it's benefit ? 5

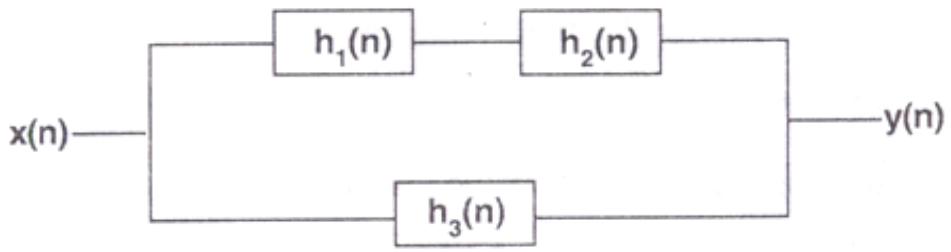
5. (a) Determine the z-transform of $\cos(w_0n)u(n)$. 5

(b) State and prove the differentiation property of Z-transform. 5

6. (a) Calculate the DFT of the discrete sequence x(n)={ −1, 2 ,−1 ,1}. 5

(b) State and prove multiplication of two DFT and circular convolution. 5

7. (a) Determine the impulse response of the resultant system. 5



$h_1(n)=nu(n)$, $h_2(n)=\delta(n-1)$ and $h_3(n)=\delta(n-1)$

(b) Find the output of the system using DFT IDFT method having impulse response

$h(n)=\{1,2,3\}$ for the input $x(n)=\{-1,1,-1\}$. 5

8. Write short notes on any **two** of the following: 5×2

(a) One sided Z-transform

(b) Region of convergence

(c) Static and Dynamic system

(d) Properties of DFT.