GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fifth Semester – Regular) Examinations, December – 2022

BPECS5060 / BPECT5060 – Introduction to Digital Signal Processing

(CSE / CST)

Time: 3 hrs　　　　　　　　　　　　　　　　　　　　　　　　Maximum: 70 Marks

Answer ALL Questions
The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)　　　　　　　　　　**(1 x 10 = 10 Marks)**

Q.1. Answer *ALL* questions　　　　　　　　　　　　　　　　　　CO#　PO#

a. A signal is a power signal when the signal has　　　　　　　　　　1　　1
   (i) Infinite average power　　　　　(ii) Finite average power
   (iii) Zero average power　　　　　　(iv) None Of The Above

b. x (n)*δ(n-k)=?　　　　　　　　　　　　　　　　　　　　　　　1　　2
   (i) x(k)　　　　　　　　　　　　　(ii) x(n)
   (iii) x(k)*δ(n-k)　　　　　　　　　(iv) x(k)*δ(k)

c. A system is said to be casual if the output of the system depends on the　2　　1
   (i) Past & Present Inputs　　　　　(ii) Future Input
   (iii) Past & Future Inputs　　　　　(iv) Present input

d. Which block of the discrete time systems requires memory in order to store the previous input?　2　　1
   (i) Signal Multiplier　　　　　　　(ii) Unit Delay
   (iii) Unit Advance　　　　　　　　(iv) None

e. Which of the following is not a dynamic system?　　　　　　　　　2　　1
   (i) y(n) = y(n-1) + y(n+1)　　　　(ii) y(n) = y(n-1)
   (iii) y(n) = x(n)　　　　　　　　　(iv) y(n) + y(n+1) + y(n+3) = 0

f. Which of the following is correct regarding to impulse signal?　　　　3　　1
   (i) $x[n]\delta[n] = x[0]\delta[n]$　　　　(ii) $x[n]\delta[n] = \delta[n]$
   (iii) $x[n]\delta[n] = x[n]$　　　　　(iv) $x[n]\delta[n] = x[0]$

g. What is the commutative property?　　　　　　　　　　　　　　3　　1
   (i) x(n)*h(n)=h(n)*x(n)　　　　　(ii) x(n)+h(n)=h(n)+x(n)
   (iii) x(n)**h(n)=h(n)**x(n)　　　　(iv) x(n)h(n)=h(n)x(n)

h. Which among the following operations is/are not involved /associated with the computation process of linear convolution?　3　　1
   (i) Folding Operation　　　　　　　(ii) Shifting Operation
   (iii) Multiplication Operation　　　(iv) Integration Operation

i. What is the Z-transform of unit impulse signal?　　　　　　　　　4　　1
   (i) 1　　　　　　　　　　　　　　(ii) 0
   (iii) ∞　　　　　　　　　　　　　(iv) -1

j. What is the RoC of causal finite signal?　　　　　　　　　　　　4　　1
   (i) Entire Z-plane except z=0　　　(ii) Entire Z-plane except z=∞
   (iii) Entire Z-plane except z=0 and z=∞　　(iv) $|z| > |a|$

PART – B: (Short Answer Questions)   **(2 x 10 = 20 Marks)**

Q.2. Answer **ALL** questions

		[CO#]	[PO#]
a.	Draw a causal discrete time signal?	1	1
b.	What is the difference between causal and non-causal signal?	1	1
c.	What are the representations of the discrete time signal?	1	1
d.	What are basic elements of block diagram?	2	1
e.	What are the properties of linear convolution?	3	1
f.	What is the z transform of unit step signal?	4	2
g.	What do mean by stability?	4	1
h.	What is cross correlation?	3	1
i.	What is the folding property of z-transform?	4	1
j.	What are the methods for finding inverse z-transform?	4	1

PART – C: (Long Answer Questions)   **(10 x 4 = 40 Marks)**

Answer **ALL** questions

		Marks	[CO#]	[PO#]
3. a.	Determine whether the signal is Energy signal or Power Signal if $x(n) = 2^n u(n)$.	5	1	2
b.	Check whether the system is linear or nonlinear if $y(n) = 2x(-n)$.	5	2	2

(OR)

		Marks	[CO#]	[PO#]
c.	Find the Even and Odd component of $x(n) = \{6, -3,2,0,4\}$.	5	1	2
d.	Check whether the system is stable or unstable if $h(n) = \left(\frac{1}{4}\right)^n u(n)$.	5	2	2
4. a.	Find the linear convolution of $x(n) = \{1,0, -3,4,2\}$ and $h(n) = \{2, -5,3, -1\}$ using time domain formula.	10	3	2

(OR)

		Marks	[CO#]	[PO#]
b.	Perform the cross correlation between x(n)={2,0,-2,3,4} and y(n)={1,-1,4,-2}	10	3	2
5. a.	Prove the Differentiation property of Z-transform	5	4	1
b.	Find the z-transform of $x(n) = n2^n u(n - 1)$.	5	4	2

(OR)

		Marks	[CO#]	[PO#]
c.	Check Whether the given system is causal and stable. $$y(n) = 3x(n - 2) + 3x(n + 2)$$	5	2	2
d.	Test whether the system is time variant or not: $y(n) = 2x(n) - 3x(n - 1)$.	5	4	2
6. a.	Find the inverse z-transform of $X(z)$, When i) RoC:$\|z\| > 1$ ii) RoC:$\|z\| < 0.5$ iii) RoC:$0.5 < \|z\| < 1$, where $$X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$	10	4	2

(OR)

		Marks	[CO#]	[PO#]
b.	Draw the block diagram of $$y(n) - 3y(n - 1) - 5y(n - 2) = x(n) + 3x(n - 1) + 2x(n - 2)$$	5	2	2
c.	Find the homogeneous solution of $$y(n) - 2y(n - 1) - 5y(n - 2) = x(n) + 4x(n - 1)$$	5	3	2

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