Enrollment No:	Exam Seat No:
	Limit Sent 1101

C.U.SHAH UNIVERSITY

Winter Examination-2015

Subject Name: Signals and Systems

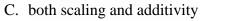
Subject Code: 4TE05SAS1 Branch: B.Tech(IC)

Semester: 5 Date: 2/12/2015 Time: 2:30 To 5:30 **Marks**: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.

	` ′	Oraw neat diagrams and figures (if necessary) at right places. Assume suitable data if needed.	
)-1	Answe	r following questions:	14
	1.	Data have discrete states and take discrete values.	
		A. Analog	
		B. Digital	
		C. A and B both	
		D. None of the above	
	2.	Frequency and period are	
		A. inverse of each other	
		B. proportional to each other	
		C. the same	
		D. none of the above	
	3.	is the rate of change with respect to time.	
		A. Amplitude	
		B. Time	
		C. Frequency	
		D. Voltage	
	4.	A sine wave in the domain can be represented by one single spike in the	
		domain.	
		A. time; frequency	
		B. frequency; time	
		C. time; phase	
		D. phase; time	
	5.	The of a composite signal is the difference between the highest and the	
		lowest frequencies contained in that signal.	
		A. frequency	
		B. period	
		C. bandwidth	
		D. amplitude	



A system which is linear is said to obey the rules of

A. Scaling B. Additivity



D. none of the above

- 7. A time invariant system is a system whose output
 - A. Increases with a delay in input
 - B. Decreases with a delay in input
 - C. Remains same with a delay in input
 - D. Vanishes with a delay in input
- **8.** A system is said to be defined as non causal, when
 - A. The output at the present depends on the input at an earlier time
 - B. The output at the present does not depend on the factor of time at all
 - C. The output at the present depends on the input at the current time
 - D. the output at the present depends on the input at a time instant in the future
- **9.** All causal systems must have the component of
 - A. Memory
 - B. Time invariance
 - C. Stability
 - D. Linearity
- 10. The period of the function $\cos \pi(t-1)/4$ is
 - A. 1/8 seconds
 - B. 8 seconds
 - C. 4 seconds
 - D. 1/4 seconds
- 11. The analog signal x(t) is given below $x(t) = 4 \cos 100 \text{ p}t + 8 \sin 200 \text{ p}t + \cos 300 \text{ p}t$, the Nyquist sampling rate will be
 - A. 1/100
 - B. 1/200
 - C. 1/300
 - D. 1/600
- 12. The region of convergence of z-transform of $x(n) = a^n u(n)$ is
 - A. z > a
 - B. z < a
 - C. |z| > a
 - D. |z| < a
- 13. A function having frequency f is to be sampled. The sampling time T should be,
 - A. T = 1/2 f
 - B. T > 1/2 f
 - C. T < 1/2 f
 - D. $T \ge 1/2 f$
- 14. The Fourier series of an odd periodic function contains
 - A. Odd harmonics only
 - B. Even harmonics only
 - C. Cosine harmonics only
 - D. Sine harmonics only



Attempt any four questions from Q-2 to Q-8

Q-2 a) Explain the classifications of signals.

07

b) If $x(n) = \{1,3,-2,0,2,-2,1,3\}$, find out following:

07

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i. x(n-2)

- iv. x(n+3)
- vi. x(2n)

- ii. x(-n-2)
- v. x(-n+3)
- vii. x(n/2)

- iii. x(-n)
- **Q-3** a) If y(n) = x(n) * h(n), then find out y(n) for $x(n) = \{1,2,3\}$ and $h(n) = \{1,2,-2,-1\}$
 - b) Obtain the Fourier components of the periodic rectangular function f(t), Where, f(t) = 0 for -T/2 < t < -T/4 = A for -T/4 < t < T/4
 - =A for -T/4 < t < T/4=0 for T/4 < t < T/2
- Q-4 a) Explain Parseval's theorem for Fourier series and Fourier transform. 07
 - b) Determine the Fourier transform of the rectangular pulse expressed by, f(t) = 1, for 0 < t < T
 - = 0, otherwise.
- Q-5 a) Enlist and state in brief the properties of Laplace transform. 07
 - b) Find out the Laplace transform of following functions: 07
 - i. Unit step function
 - ii. Exponential function
 - iii. Sine function
 - iv. Cosine function
- **Q-6** a) What is z-transform? Define ROC of z-transform and enlist important properties of ROC for z-transform.
 - b) What is time scaling property of z-transform? Derive the z-transform of following signals using time scaling property.
 - i. $x(n) = a^n \cos \omega_0 n$

- ii. $x(n) = a^n \sin \omega_0 n$
- Q-7 a) Find out the inverse z-transform of following using partial fraction method: $sX(z) = \frac{z}{3z^2 4z + 1}$

If the ROC are, a) |z| > 1, b) |z| < 1/3

b) Find the x(n) for $X(z) = \frac{z}{(z-1)^3}$ 07



Q-8	a)	Explain the sampling theorem. What is a Nyquist criterion? How the aliasing	07
		error generated during reconstruction of signal can be eliminated?	
	b)	Draw and explain the block diagram of A to D conversion in detail.	07