Enrollment No......................................

Faculty of Engineering
End Sem Examination May-2024
EE3CO27 Signals & Systems

Programme: B.Tech.   Branch/Specialisation: EE

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1   i.   In the time domain unit step signal is represented by: **1**
       (a) r(t)   (b) u(t)   (c) $\delta(t)$ (d) None of these

   ii.   The energy signal has _____ time average power and _____ energy.   **1**
       (a) Zero; finite   (b) Finite; finite
       (c) Finite; zero   (d) Zero; zero

   iii.   The Fourier transform of a unit impulse function $\delta(t)$ is: **1**
       (a) 0   (b) 1   (c) ∞ (d) ω

   iv.   Trigonometric Fourier Series representation of an odd function consists of: **1**
       (a) Cosine terms only
       (b) Sine terms only
       (c) Both cosine and sine terms
       (d) None of these

   v.   An important property for the causality of the system is: **1**
       (a) It is memory less   (b) Final rest
       (c) Initial rest   (d) It is unstable

   vi.   An LTI system is memory less only if: **1**
       (a) It does not store the previous value of the input
       (b) It does not depend on any previous value of the input
       (c) It does not depend on stored value of the system
       (d) It does not depend on the present value of the input

   vii.   If x[n]*h[N]=h[N]*x[N], then the property is known as: **1**
       (a) Non-linearity   (b) Distributive
       (c) Associative   (d) Commutative

viii. An LTI system is said to causal if and only if: **1**
(a) Impulse response is nonzero for positive values of n
(b) Impulse response is zero for positive values of n
(c) Impulse response is nonzero for negative values of n
(d) Impulse response is zero for negative values of n

ix. Z – Transform of impulse function is- **1**
(a) 0   (b) 1   (c) -1   (d) ∞

x. ROC stands for- **1**
(a) Region of convergence   (b) Radius of convolution
(c) Region of convolution   (d) Region of communication

Q.2 i. How are signals classified? **2**
ii. Distinguish between energy & power signals. **3**
iii. Explain the following properties of signals: **5**
(a) Time Shifting
(b) Time Scaling

OR iv. Write any five comparisons between periodic and aperiodic **5**
signals.

Q.3 i. Explain trigonometric Fourier series. **2**
ii. Find the Laplace transform of the given waveform- **8**
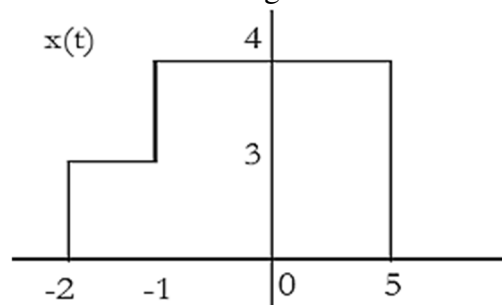
OR iii. Find the Fourier transform of the given waveform- **8**
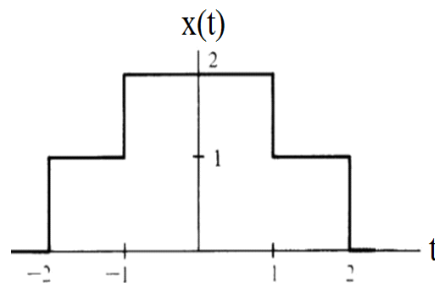
Q.4 i. Explain the following properties of Continues Time System (CTS)- **3**
(a) Linearity & non-linearity
(b) Causal & non-causal
(c) Time variant & invariant

ii. What is convolution integral? Explain the various property of **7**
convolution integral.

OR iii. What is continuous time system? Explain its properties in detail. **7**

Q.5 i. Discuss following properties of discrete time system with example- **4**
(a) Stable & unstable system
(b) Time variant &time invariant system

ii. What is convolution sum? Explain the various property of **6**
convolution sum.

OR iii. Determine the convolution sum of following signals: **6**
$x(n)= \{1, -2, -3\}, h(n)= \{0, 0, 1, 1, 1, 1\}$
use analytical and graphical method.

Q.6 Attempt any two:
i. What are the various properties of Z-Transform? **5**
ii. What is region of convergence in context of Z-Transform? **5**
iii. Explain inverse Z-Transform, with stability analysis. **5**

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Marking Scheme
Signals & Systems (T) - EE3CO27 (T)

Q.1	i)	b) u(t)		**1**
	ii)	a) zero; finite		**1**
	iii)	b) 1		**1**
	iv)	b) Sine terms only		**1**
	v)	c) Initial rest		**1**
	vi)	b) It does not depend on any previous value of the input		**1**
	vii)	d) Commutative		**1**
	viii)	d) Impulse response is zero for negative values of n		**1**
	ix)	b) Loz….		**1**
	x)	a) Region of convergence		**1**

Q.2	i.	How are signals Classified	(1 mark for each step)	**2**
	ii.	Distinguish between energy & Power Signals.		**3**
		(1 mark for each difference)	(1Mark*3)	
	iii.	a) Time Shifting	(2.5 Marks)	**5**
		b) Time Scaling	(2.5 Marks)	
OR	iv.	Five comparisons between periodic and aperiodic signals.		**5**
			(1 Mark*5)	

Q.3	i.	Explain trigonometric Fourier series.	(1 Mark for each step)	**2**
	ii.	Find the Laplace transform of the given waveform.		**8**
			(Stepwise solution)	
OR	iii.	The Fourier transform of the given waveform.		**8**
			(Stepwise solution)	

Q.4	i.	Explain the following properties of Continues Time System (CTS).	(1 Mark*3)	**3**
		a) Linearity & non-linearity		
		b) Causal & non-causal		
		c) Time Variant & Invariant		
	ii.	What is convolution integral?	(3 Marks)	**7**
		Explain the various property of convolution integral.	(4 Marks)	
OR	iii.	What is continuous time system?	(3 marks)	**7**
		Explain its properties in details	(4 marks)	

Q.5	i.	a) Stable & unstable system	(2 Marks)	**4**

		b) Time variant &time invariant system	(2 Marks)	
	ii.	What is convolution sum?	(3 marks)	**6**
		Explain the various property of convolution sum.	(3 marks)	
OR	iii.	Determine…….. method	3 Marks	**6**
		and graphical method.	3 Marks	

Q.6		Attempt any two:		
	i.	Various properties of Z-Transform	(1 Mark on each step)	**5**
	ii.	Region of ….. Z-Transform	(1 Mark on each step)	**5**
	iii.	Explain inverse …… stability analysis.	(1 Mark on each step)	**5**

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