

University of Mumbai
Examination 2020- Inter Cluster

Program: BE Instrumentation Engineering

Curriculum Scheme: Revised 2012

Examination: Third Year Semester V

Course Code: ISC501 and Course Name: Signals and Systems

Time: 1hour

Max. Marks: 50

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Note to the students: - All Questions are compulsory and carry equal marks.

Q1.	Analog signal can be converted into discrete time signals by
Option A:	Sampling
Option B:	Quantization
Option C:	Coding
Option D:	Filtering
Q2.	The sum of two periodic signals is periodic only if the ratio of their respective periods T_1/T_2 is
Option A:	A rational number
Option B:	An irrational number
Option C:	A complex number
Option D:	A real number
Q3.	The signal is an energy signal if
Option A:	$E=0, P=0$
Option B:	$E=\infty, P=\text{finite}$
Option C:	$E=\text{finite}, P=0$
Option D:	$E=\text{finite}, P=\infty$
Q4.	The system whose output depends on future inputs is a
Option A:	Static system
Option B:	Dynamic system
Option C:	Non-causal system
Option D:	Dynamic and non-causal both
Q5.	$y[n]=x[2n]$ is a
Option A:	Time-invariant system
Option B:	Time variant, dynamic system
Option C:	Linear, time variant, dynamic system
Option D:	Linear, time invariant, static system
Q6.	$x(t)=e^{-5t}u(t)$ is a
Option A:	Power signal
Option B:	Energy signal

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Option C:	Neither power nor energy signal
Option D:	Both energy and power signal
Q7.	$\delta(at) =$
Option A:	$\delta(t)$
Option B:	$\frac{1}{ a } \delta(t)$
Option C:	$\frac{1}{ a } \delta(t)$
Option D:	$\delta^2(t)$
Q8.	$\int_{-\infty}^{\infty} x(\tau) \delta(t-\tau) d\tau =$
Option A:	$x(t)$
Option B:	$x(\tau)$
Option C:	$x(t) \delta(t)$
Option D:	$x(t-\tau)$
Q9.	If $x[n] = [1 \ 1 \ 2 \ -1]$ and $h[n] = [1 \ 0 \ 1]$, what would be the sequence $y[n]$ considering linear convolution?
Option A:	$y[n] = [-1 \ 2 \ 0 \ 3 \ 1 \ 1]$
Option B:	$y[n] = [3 \ 1 \ 1 \ -1 \ 2 \ 0]$
Option C:	$y[n] = [1 \ 1 \ 3 \ 0 \ 2 \ -1]$
Option D:	$y[n] = [-1 \ -1 \ 3 \ 0 \ 2 \ 1]$
Q10.	For the existence of Fourier series, Dirichlet's conditions are
Option A:	Necessary
Option B:	Sufficient
Option C:	Necessary and sufficient
Option D:	Necessary but not sufficient
Q11.	The Exponential Fourier Series coefficient C_n in terms of Trigonometric Fourier series coefficient is
Option A:	$C_n = \frac{1}{2}(a_n + jb_n)$
Option B:	$C_n = \frac{1}{2}(a_n - jb_n)$
Option C:	$C_n = (a_n - jb_n)$
Option D:	$C_n = (a_n + jb_n)$
Q12.	Fourier Series applies to
Option A:	Only periodic signals
Option B:	Only aperiodic signals
Option C:	Both periodic and aperiodic signals
Option D:	Only random signals
Q13.	The Inverse Fourier Transform $x(t)$ of $X(\omega)$ is given by $\frac{1}{2\pi}$
Option A:	$\int_{-\infty}^{\infty} X(\omega) e^{-j\omega t} d\omega$
Option B:	$\int_{-\infty}^{\infty} X(\omega) e^{j\omega t} d\omega$

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Option C:	$\int_{T/2}^{T/2} X(\omega) e^{-i\omega t} d\omega$
Option D:	$\int_{-\infty}^{\infty} F(\omega) d\omega$
Q14.	The Fourier Transform of $x(-t)$ is
Option A:	$X(\omega)$
Option B:	$X(-\omega)$
Option C:	$X(1/\omega)$
Option D:	$-X(\omega)$
Q15.	The area under Fourier Transform, i.e., $\int_{-\infty}^{\infty} X(\omega) d\omega =$
Option A:	$x(0)$
Option B:	$X(0)$
Option C:	$2\pi x(0)$
Option D:	$\frac{1}{2}\pi x(0)$
Q16.	Which one of the following cannot be the ROC of $\frac{5}{(s+3)(s+4)}$
Option A:	$\text{Re}(s) > -3$
Option B:	$\text{Re}(s) < -4$
Option C:	$-4 < \text{Re}(s) < -3$
Option D:	$-3 < \text{Re}(s) < -4$
Q17.	Inverse Laplace Transform of $\left[\frac{1}{(s+1)(s+2)}\right]$ for ROC; $-2 < \text{Re}(s) < -1$ is
Option A:	$e^{-t} u(t) - e^{-2t} u(t)$
Option B:	$-e^{-t} u(-t) - e^{-2t} u(t)$
Option C:	$e^{-t} u(-t) - e^{-2t} u(-t)$
Option D:	$e^{-t} u(t) + e^{-2t} u(-t)$
Q18.	According to the time-shifting property of Laplace Transform, shifting the signal in time domain corresponds to the
Option A:	Multiplication by e^{-st_0} in the time domain
Option B:	Multiplication by e^{-st_0} in the frequency domain
Option C:	Multiplication by e^{st_0} in the time domain
Option D:	Multiplication by e^{st_0} in the frequency domain
Q19.	When is the system said to be causal as well as stable in accordance to pole/zero of ROC specified by system transfer function?
Option A:	Only if all the poles of system transfer function lie in left-half of S-plane
Option B:	Only if all the poles of system transfer function lie in right-half of S-plane
Option C:	Only if all the poles of system transfer function lie at the center of S-plane
Option D:	It can be anywhere
Q20.	The Z transform of a system is $H(z) = \frac{z}{z-0.8}$. If the ROC is $ z < 0.8$, the impulse

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	response of the system is
Option A:	$(0.8)^n u(n)$
Option B:	$-(0.8)^n u(-n-1)$
Option C:	$-(0.8)^n u(n)$
Option D:	$(0.8)^n u(-n-1)$
Q21.	The ROC of a causal and stable system must include the
Option A:	Origin
Option B:	Infinity
Option C:	A ring
Option D:	Unit circle
Q22.	If $X(z)$ is the z transform of $x(n)$, the initial value theorem states that
Option A:	$\lim_{z \rightarrow 1} (z-1) X(z)$
Option B:	$\lim_{z \rightarrow 0} X(z)$
Option C:	$\lim_{z \rightarrow \infty} X(z)$
Option D:	$\lim_{z \rightarrow \infty} zX(z)$
Q23.	What is the z-transform of the signal $x(n) = (0.5)^n u(n)$?
Option A:	$1/(1-0.5z^{-1})$; ROC: $ z > 0.5$
Option B:	$1/(1-0.5z^{-1})$; ROC: $ z < 0.5$
Option C:	$1/(1+0.5z^{-1})$; ROC: $ z > 0.5$
Option D:	$1/(1+0.5z^{-1})$; ROC: $ z < 0.5$
Q24.	The z transform of a signal with $X(s) = (1/s)$ is
Option A:	$\frac{1}{1-z^2}$
Option B:	$\frac{1}{1-z}$
Option C:	$\frac{1}{1+z^{-1}}$
Option D:	$\frac{1}{1+z}$
Q25.	Which statement about ROC is not true?
Option A:	ROC does not contain any pole
Option B:	ROC consists of a circle in z plane centered at origin
Option C:	ROC is a ring or disk in z plane
Option D:	ROC contains both poles and zeros