University of Mumbai
Examination 2020- Inter Cluster

Program: BE Instrumentation Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code and Course Name: ISC501 Signals and Systems

Time: 1hour Max. Marks: 80

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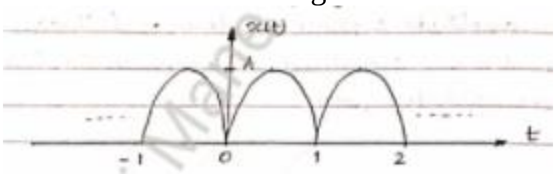
Q.1] Choose the correct option for following questions. All Questions are compulsory and carry equal marks. Marks 40

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 T1/T2 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=∞, P=finite
Option C:	E=finite, P=0
Option D:	E=finite, P=∞
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-variant system
Option B:	Time varying, dynamic system
Option C:	Linear, time varying, 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
Option C:	Neither power nor energy signal
Option D:	Both energy and power signal
Q7.	δ (at) =
Option A:	δ (t)
Option B:	$\|a\|$ δ (t)
Option C:	$1/\|a\|$ δ (t)
Option D:	δ^2 (t)
Q8.	$\int_{-\infty}^{\infty} x(\tau)\, \delta(t-\tau) d\tau =$
Option A:	x (t)
Option B:	x (τ)
Option C:	x (t) δ (t)
Option D:	x (t- τ)
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:	$C_{-n} = ½(a_n+jb_n)$
Option B:	$C_{-n} = ½(a_n-jb_n)$
Option C:	$C_{-n} = (a_n-jb_n)$
Option D:	$C_{-n} = (a_n+jb_n)$
Q12.	Fourie 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(ω) is given by ½ π
Option A:	$\int_{-\infty}^{\infty} X(\omega) e^{-i\omega t} d\omega$

Option B:	$\int_{-\infty}^{\infty} X(\omega)e^{i\omega t}d\omega$
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(ω)
Option B:	X(-ω)
Option C:	X(1/ω)
Option D:	-X(ω)
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 π x(0)
Option D:	½ π x(0)
Q16.	Which one of the following cannot be the ROC of $\frac{5}{(s+3)(s+4)}$
Option A:	Re(s) > -3
Option B:	Re(s) < -4
Option C:	-4 < Re(s) < -3
Option D:	-3 < Re(s) < -4
Q17.	L^{-1} [$\frac{1}{(s+1)(s+2)}$] for ROC; -2 < 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^{-st0} in the time domain
Option B:	Multiplication by e^{-st0} in the frequency domain
Option C:	Multiplication by e^{st0} in the time domain
Option D:	Multiplication by e^{st0} 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 $\lvert z \rvert < 0.8$, the impulse 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:	$(0.8)^n u(-n-1)$

Q.2	Solve any two.	Marks 20
1	Find Inverse Laplace Transform for given ROC. (i) $X(s) = \frac{2s+1}{(s+2)(s-3)}$; Re{s}>3 (ii) $X(s) = \frac{s2+6s+7}{(s+2)(s-3)}$; Re{s}>3	
2	(i) Determine trigonometric Fourier series representation for the full wave rectified signal. 	
3	Check whether following signals are power or energy or neither. Find energy and power of signals. (i) $x(t) = Ae^{-5t}u(t)$ (ii) $x(t) = A$ for all t	

Q.3	Solve any two.	Marks 20
1	Solve the following difference equation using Z transform for n>=0 $x[n-2]-9x[n-1]+18x[n]=0$ when the initial conditions are $x[-1]=1$ and $x[-2]=9$	
2	State and prove frequency shifting property of Fourier Transform. Hence find the Fourier Transform of e^{jw0t}	
3	Classify following systems for linearity, causality, time variency, stability and invertibility (i) $y(t) = x(3t)$ (ii) $y[n] = x[n^2]$	