# University of Mumbai

## Examination 2020- Inter Cluster

Program: BE Instrumentation Engineering

Curriculum Scheme: Revised 2016

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.

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| 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-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 |
| Option C: | Neither power nor energy signal |
| Option D: | Both energy and power signal |

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| Q7. | δ (at) = |
| Option A: | δ (t) |
| Option B: | $\|a\|$ δ (t) |
| Option C: | 1/$\|a\|$ δ (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) δ (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: | $C_{-n} = ½(a_n+jb_n)$ |
| 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. | 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(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: | $\int_{T/2}^{T/2} X(\omega)e^{-i\omega t}d\omega$ |

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| 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. | Inverse Laplace Transform of $[\frac{1}{(s+1)(s+2)}]$ 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) |

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| Option C: | $-(0.8)^n u(n)$ |
| Option D: | $(0.8)^n u(-n-1)$ |
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| 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: | $z \xrightarrow{Lim} 1$ (z-1) X(z) |
| Option B: | $z \xrightarrow{Lim} 0$ X(z) |
| Option C: | $z \xrightarrow{Lim} \infty$ X(z) |
| Option D: | $z \xrightarrow{Lim} \infty$ 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 |