Program: BE Electronics and Telecommunication Engineering

Curriculum Scheme: Revised 2012

Examination: Third Year Semester VI

Course Code: EXC504 Course Name: Signals and Systems

Time: 1 hour Max. Marks: 50

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

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| Q1.  | What is the area of a Unit Impulse function? |
| Option A: | Zero  |
| Option B: | Half of Unity |
| Option C: | Depends on the function |
| Option D:  | Unity |
|  |  |
| Q2. |  What are the singularity functions? |
| Option A: | Derivatives and integrals of unit impulse functions |
| Option B: | Derivatives of a unit impulse function |
| Option C: | Integrals of an impulse function |
| Option D: | Sum of successive impulse function |
|  |  |
| Q3. |  How are discrete unit impulse functions and discrete time unit step functions related? |
| Option A: | They are inverse of each other |
| Option B: | ∂(n)=u(n)-u(n-1) |
| Option C: | ∂(n)=u(n)\*2∂ |
| Option D: | Integration of unit step function gives unit step function |
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| Q4. | Which of the following systems is stable? |
| Option A: | y(t) = log(x(t)) |
| Option B: | y(t) = sin(x(t)) |
| Option C: | y(t) = exp(x(t)) |
| Option D: | y(t) = tx(t) + 1 |
|  |  |
| Q5. | An LTI system with unit sample response h[n]=5δ[n]−7δ[n−1]+7δ[n−3]−5δ[n−4] is a |
| Option A: | * low-pass filter
 |
| Option B: | * high-pass filter
 |
| Option C: | Band-pass filter |
| Option D:  | Band-stop filter |
|  |  |
| Q6. | Which one of the following is an eigen function of the class of all continuous-time, linear, timeinvariant systems (u(t)ut denotes the unit-step function)? |
| Option A: | * ejω0tu(t)
 |
| Option B: | * cos(ω0t)
 |
| Option C: | sin(ω0t) |
| Option D:  | ejω0t |
|  |  |
| Q7.  | A continuous-time function x(t) is periodic with period T. The function is sampled uniformly with a sampling period Ts. In which one of the following cases is the sampled signal periodic? |
| Option A: | * T=2√Ts
 |
| Option B: | T=1.2Ts |
| Option C: | Always |
| Option D:  | Never |
|  |  |
| Q8.  | Consider the sequence x[n] = anu[n]+bnu[n], where u[n] denotes the unit-step sequence, 0 < |a| < |b| < 1.The region of convergence (ROC) of the z-transform of x[n] is |
| Option A: | * |z|>|a|
 |
| Option B: | * |z|>|b|
 |
| Option C: | * |z|<|a|
 |
| Option D:  | a|<|z|<|b| |
|  |  |
| Q9. | Consider the signal x(t)=cos(6πt)+sin(8πt), where t is in seconds. The Nyquist sampling rate (in samples/second) for the signal y(t)=x(2t+5) is |
| Option A: | 8 |
| Option B: | 12 |
| Option C: | 16 |
| Option D:  | 32 |
|  |  |
| Q10.  | If the signal x(t)=sin(t)/πt\*sin(t)/πt  with \*  denoting the convolution operation, then x(t) is equal to |
| Option A: | * sin(t)/πt
 |
| Option B: | sin(2t)/2πt |
| Option C: | * 2sin(t)/πt
 |
| Option D:  | (sin(t)/πt)2 |
|  |  |
| Q11.  | A discrete-time signal  x[n]=δ[n−3]+2δ[n−5] has z transform X(z). If Y(z)=X(−z) is the z-transform of another signal y[n], then |
| Option A: | y[n] = x[n] |
| Option B: | y[n] = x[-n] |
| Option C: | y[n] = -x[n] |
| Option D:  | y[n] = -x[-n] |
|  |  |
| Q12.  | If F(s)=L[f(t)]=2(s+1)/s2+4s+7 then the initial and final values of f(t) are respectively |
| Option A: | 0, 2 |
| Option B: | 2, 0 |
| Option C: | 0, 2/7 |
| Option D: | 2/7, 0 |
|  |  |
| Q13. | The 4 point Discrete Fourier Transform (DFT) of a discrete time sequence {1, 0, 2, 3} is |
| Option A: | * [0, -2 + 2j, 2, -2 -2j]
 |
| Option B: | * [2, 2 + 2j, 6, 2 - 2j]
 |
| Option C: | * [6, 1 -3j, 2, 1 + 3j]
 |
| Option D:  | [6, -1 + 3j, 0, -1 -3j] |
|  |  |
| Q14.  | A discrete time linear shift-invariant system has an impulse response h[n] with h[0]=1, h[1]=-1. h[2]=-2, and zero otherwise. The system is given an input sequence x[n] with x[0]=x[2]=1, and zero otherwise. The number of nonzero samples in the output sequence y[n], and the value of y[2] are, respectively |
| Option A: | 5, 2 |
| Option B: | 6, 2 |
| Option C: | 6, 1 |
| Option D:  | 5, 3 |
|  |  |
| Q15. | The *z*-transform *X*[*z*] of a sequence *x*[*n*] is given by X[z]= 0.5/ 1-2z-1. It is given that the region of convergence of *X*[*z*] includes the unit circle. The value of *x*[0] is |
| Option A: | -0.5 |
| Option B: | 0.25 |
| Option C: | 0 |
| Option D:  | 0.5 |
|  |  |
| Q16.  | If the Laplace transform of a signal *y*(*t*) is Y(s)=1/s(s−1), then its final value is |
| Option A: | -1 |
| Option B: | 0 |
| Option C: | 1 |
| Option D:  | Unbounded |
|  |  |
| Q17. | The impulse response *h*(*t*) of a linear time invariant continuous time system is given by *h*(*t*) = exp (-2*t*)*u*(*t*) , where *u*(*t*) denotes the unit step function.The output of this system to the sinusoidal input *x* (*t*) = 2cos (2*t*) for all time *t*, is |
| Option A: | 0 |
| Option B: | 2−0.25cos(2t − 0.125π) |
| Option C: | 2−0.5cos(2t − 0.125π) |
| Option D: | 2−0.5cos(2t − 0.25π) |
|  |  |
| Q18. | The impulse response h(t) of a linear time-invariant continuous time system is described by h(t)=exp(αt)u(t)+exp(βt)u(−t), where u(t)denotes the unit step function, and α and β are real constants. This system is stable if |
| Option A: | α is positive and β is positive |
| Option B: | α is negative and β is negative |
| Option C: | α is positive and β is negative |
| Option D:  | α is negative and β is positive |
|  |  |
| Q19.  | What is the consequence of marginally stable systems? |
| Option A: | The system will turn out to be critically damped |
| Option B: | The system will turn out to be overdamped |
| Option C: | It will be a damped system |
| Option D:  | It will be purely oscillatory system |
|  |  |
| Q20. | What are the mathematical tools to convert a system from a time domain to frequency domain? |
| Option A: | Fourier series, Fourier transform, Laplace transform, Z-transform |
| Option B: | Fourier series only |
| Option C: | Fourier series and Laplace transform only |
| Option D: | Fourier series, Fourier transform and Laplace transform only. |
|  |  |
| Q21. | If h1, h2 and h3 are parallelly summed, find the overall impulse response |
| Option A: | h1 + h2 + h3 |
| Option B: | h1\*h2\*h3 |
| Option C: | h1-h2-h3 |
| Option D:  | (h1xh2xh3) |
|  |  |
| Q22.  | How do you define convolution? |
| Option A: |  Addition of responses of an input signal |
| Option B: | Weighted superposition of time shifted responses |
| Option C: | Multiplication or various shifted responses of a stable system |
| Option D:  | Superposition of various outputs |
|  |  |
| Q23. | Which is the commutative property of the LTI System in case of discrete time system? |
| Option A: | x[n]+h[n]=h[n]+x[n] |
| Option B: | x[n]+h[n]=h[n]\*x[n] |
| Option C: | x[n]\*h[n]=h[n]\*x[n] |
| Option D:  | x[t]\*h[t]=h[n]\*x[n] |
|  |  |
| Q24.  | The order of the Cascade system doesn’t depend on the output. Which is the property? |
| Option A: | Commutative |
| Option B: | Associative  |
| Option C: | Commutative and distributive |
| Option D:  | Distributive  |
|  |  |
| Q25. | Which property of an LTI system does the following equation prove h[n]\* h-1 [n] = ∂[n] ? |
| Option A: | Associative |
| Option B: | Invertibility  |
| Option C: | Distributive |
| Option D:  | commutative |