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Total Pages : 4

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Dec., 2018

B.Tech. Examination IIIrd Semester

SIGNAL AND SYSTEM

(EC-303)

(ECC-01)

(ECC-01)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

(i) It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.

(ii) Answer any four questions from Part-B in detail.

(iii) Different sub-parts of a question are to be attempted adjacent to each other.

PART–A

1. (a) Define casual and noncasual system. 1.5 (1.5)

(b) State the necessary conditions for impulse response to be casual for LTI system. 1.5 (1.5)

(c) State parseval theorem for fourier transform. 1.5 (1.5)

(d) Define ROC and need of ROC. 1.5 (1.5)

(e) If z- transform of $x[n]$ is $X(z)$, then using property find the z-transform of $x[n + n_0]$. 1.5 (1.5)

(f) Describe the properties of state transition matrix. (1.5)

(g) State final value theorem for laplace transform. (1.5)

(h) If $x(t) = \sin(1000\pi t) + 2\cos(2000\pi t)$, determine nyquist rate. (1.5)

(i) State the relation between $r(t)$, $u(t)$ and $\delta(t)$. (1.5)

(j) What is the need of DFT? (1.5)

PART–B

2. (a) Plot $u(t) + u(t-1) + u(t-2) - 3u(t-3)$. (4)

(b) Define the following signal in terms of $u(t)$ and $r(t)$. (4)

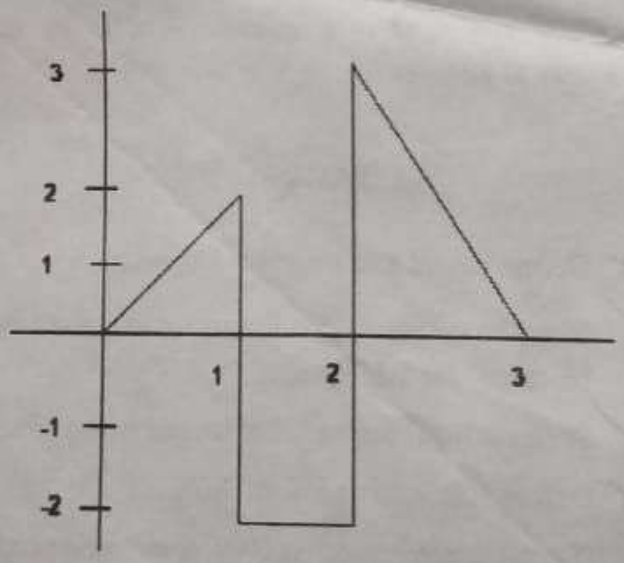

Figure 1

(c) State whether $x(t) = 2 \sin(2\pi t) + 4 \cos(8\pi t)$ is periodic or aperiodic. If periodic determine the period also. (3)

(d) Determine whether $y[n] = \cos(\omega_0 n)$. $x[n]$ is linear/ nonlinear and time variant/time invariant. (4)

3. (a) If $x(t) = u(t + 3)$ and $h(t) = u(t - 5)$. Determine $y(t)$ using convolution integeral. (8)

(b) State and prove convolution properties of fourier transform. (7)

4. (a) Determine the fourier transform of $\cos(\omega_0 t)$ in terms of impulse function. (5)

(b) Consider a periodic signal $x(t) = 2 + \cos((2\pi/3)t) + 4 \sin((5\pi/3)t)$, find the fourier series coefficient. (5)

(c) If $x[n] = [1, 2, 3, 4]$, determine the inverse fourier transform of $X(e^{j(\omega - \pi)})$. (5)

5. (a) Given $F(s) = (s + 2)/((s + 1)^2 + 5^2)$, find $f(0)$. (5)

(b) Find the laplace transform of $e^{-2t}u(t)$. Plot its ROC and state whether system is stable or unstable. (5)

(c) Consider a LTI system with response $|H(j\omega)| = \dfrac{e^{-j\omega} - \dfrac{1}{5}}{1 - \dfrac{1}{5}e^{-j\omega}}$, determines the differential equation related to input and output. (5)

6. (a) If $x[n] = [1,2,1,0]$, using DFT determine the circular convolution of $x[n]$ with $x[n]$. (8)

(b) If $X(z) = 1/(1 + z^{-1})(1 - z^{-1})2$, determine $x[n]$ using inverse z-transform. (7)

7. (a) Short note on classification of systems. (7)

(b) State and prove sampling theorem. (8)
