

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, 2024
B. Tech. (CCE), Semester III, 2024-2025

Roll No.....

EE1122: Signals and Systems

Time: 3 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Mention all the assumptions for your answers clearly.

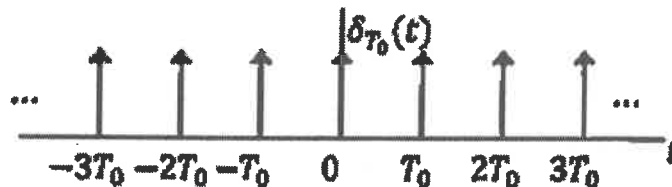
Material Required: Semi log graph paper.

- Q. 1 For a given system $y[n] = g[n] * h[n]$ 4.0
(EE1122.3)
- $h[n] = \left(\frac{2}{5}\right)^n u[n]$ and $g[n] = \text{casual sequence}$
- where $y[0] = 1$, $y[1] = 1/5$, find the sequence of $g[n]$.

- Q. 2 Determine whether the following signal is periodic. If you find that it is periodic, determine its fundamental period. 3.0
(EE1122.1)
- (i) $x(t) = \cos t + \sin \sqrt{2}t$
- (ii) $x(t) = 2 \sin\left(\frac{2}{3}\right)t + 3 \cos\left(\frac{2\pi}{5}\right)t$
- (iii) $x(n) = 2 \sin 0.8\pi n$

- Q. 3 Let $x(t)$ be a periodic signal with fundamental period $T = 2$ and Fourier coefficient a_k . Determine 4.0
(EE1122.1)
- $x(t) = \begin{cases} t, & 0 \leq t \leq 0 \\ 2 - t, & 1 \leq t \leq 2 \end{cases}$
- (i) Value of a_0 .
- (ii) Fourier series representation of $d x(t)/dt$.

- Q. 4 Consider the periodic impulse train as shown below. 3.0
(EE1122.3)



Determine the complex exponential Fourier series.

- Q. 5 A system is given as below, 4.0
(EE1122.4)
- $y(n) = \frac{1}{8}x(n) - \frac{1}{4}x(n-1) + \frac{1}{8}x(n-2)$
- find impulse response $H(e^{j\omega})$.
- Q. 6 From the given function $x(n) = \left[\frac{\sin \omega_c n}{\pi n}\right]^2$, where $0 < \omega_c < \pi$ 4.0
(EE1122.4)
- Obtain $X(e^{j\omega})$ and find maximum value of ω_c for which $x(n)$ can be recovered from $X(e^{j\omega})$.

- Q.7 Consider a system $y(t)$ which is related to two signals $x_1(t)$ and $x_2(t)$ as below
$$y(t) = x_1(t - 2) * x_2(-t + 3)$$

Where $x_1(t) = e^{-2t}u(t)$ and $x_2(t) = e^{-3t}u(t)$
Determine Laplace transform $Y(s)$ and region of convergence of the given system. 4.0
(EE1122.1)
- Q.8 A pressure gauge that can be modelled as an LTI system has a unit impulse response is given by $(te^{-t})u(t)$. For a certain input $x(t)$ the output is observed to be $(2 - 3e^{-t} + e^{-3t})u(t)$. For this observed measurement, determine the true pressure input to the gauge as a function of time. 4.0
(EE1122.2
&
EE1122.3)
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all the best!