Mahindra University Hyderabad
École Centrale School of Engineering
Minor I Examinations
Program: B. Tech. Branch: CM Year: II Semester: II
Subject: Stochastic Processes (MA2213)

Date: 02/03/2024 **Start Time: 10.00 AM**
Time Duration: 1.5 Hours **Max. Marks: 20**

Instructions:

1. All questions are compulsory.

Q 1:

Marks: 5

a) Let $Y_n = X_n + g(n)$ where X_n is a symmetric random walk process and $g(n)$ is a deterministic function of n.

(i) Find the joint cdf of Y_n and Y_{n+1}.

(ii) Find the cross-covariance function of X_n and Y_n.

Q 2:

Marks: 5

a) Let $X(t)$ be a zero-mean Gaussian random process with autocovariance function given by $C_X(t_1, t_2) = 4e^{-2|t_1 - t_2|}$. Find the joint pdf of $X(t)$ and $X(t+s)$.

Q 3:

Marks: 5

a) Let $Z(t) = X(t) - aX(t-s)$, where $X(t)$ is the Wiener process.

(i) Find the pdf of $Z(t)$.

(ii) Find $m_Z(t)$ and $C_Z(t_1, t_2)$.

Q 4:

Marks: 5

a) Find $P[N(t-d) = j | N(t) = k]$ with $d > 0$, where $N(t)$ is a Poisson process with rate λ.