Name:
Roll Number:
Department:
Program: BTech / MTech TA / MTech RA / PhD (Tick one)

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

AI5090/EE5817: Probability and Stochastic Processes

Quiz 04

Date: 29 October 2025

Question	1	2	Total
Marks Scored			

1. **(3 Marks)**

   Suppose $X, Y, Z \overset{\text{IID}}{\sim} \text{Poisson}(1)$. Determine the value of

   $$\mathbb{P}(\{X = 1\} \mid \{X + Y + Z = 10\}).$$

   Note: If $X \sim \text{Poisson}(\lambda)$ for some fixed $\lambda > 0$, then

   $$p_X(k) = e^{-\lambda} \frac{\lambda^k}{k!}, \qquad k \in \{0, 1, 2, \ldots\}.$$

2. **(2 Marks)**

   A total of n coins, each with probability of heads p, are tossed independently and simultaneously. If any one of them shows up heads, the tossing is stopped. Else, the coins are tossed again, independently of previous iterations. If N denotes the total number of rounds required until when the tossing is continued, determine $\mathbb{P}(\{N > k\})$ for some fixed $k \in \mathbb{N}$. Express your answer in terms of p, n, k.