COMSATS Institute of Information Technology, Islamabad Campus

Department of Computer Science

Discrete Structures – CSC102

BCS – II B

Assignment #4 Marks: 10 Mapped to CLO4 & CLO5

CLO4

Q1: Proof by Induction

a) Use mathematical induction to show that

$$1 + 2 + 2^2 + \cdots + 2^n = 2^{n+1} - 1$$ **for all nonnegative integers n.**

(Example 3 from chapter 5, section 5.1)

Q2: Proof by contradiction

a) **Prove that $\sqrt{2}$ is irrational by giving a proof by contradiction.**

(Example 10 from chapter 1, section 1.7)

CLO5

Q3: A bit string of length four is generated at random so that each of the 16 bit strings of length four is equally likely. What is the probability that it contains at least two consecutive 0s, given that its first bit is a 0? (We assume that 0 bits and 1 bits are equally likely.)