

Department of Computer Science and Engineering
Quiz II

Course No.: CS 207 Course Name: Discrete Structures

Date: 13/10/2023 Time: 8-25 to 9-25 a.m.

Marks: 10

Q1 Consider the $n \times n$ chessboard such that each of the n^2 squares is coloured red or blue. How many such distinct coloured chessboards are there, assuming that two boards are considered to be the same if one can be obtained from the other by rotation? Find this number assuming that boards obtained by rotation and/or reflection are considered to be the same. Show the method used for finding the answer and all intermediate steps. (5)

Q2 Prove that every poset with $km + 1$ elements contains either a chain with $k + 1$ elements or an antichain with $m + 1$ elements. Let (P, \leq) be a poset with km elements that does not contain any chain with $k + 1$ elements or any antichain with $m + 1$ elements. Find the minimum and maximum possible number of pairs (a, b) such that $a, b \in P$ and $a \leq b$. Prove your answer. Note that k, m are positive integers. (5)