<div align="center">

Group 2 Assignments
BCSE
Graph Theory and Combinatorics

</div>

Instructions

1. There are 3 assignments given, each of 30 marks each. There will a final mark, which will be the average of the 3 assignments.

2. This average marks obtained from the 3 assignments will be added to your final marks in the semester.

3. An assignment having two sub-parts, equal weights will be given to each part.

4. The last date for submitting your assignments is 30th June, 2021 through Google Classroom.

   Rules for working with the problems

1. There are a total of 8 assignment sheets.

2. You are allowed to discuss on the problems, read articles and then answer the questions. If you take the help of any book or article for solving your problem, refer the article/book at the end of the answer

3. However, while answering the assignments, it **will be expected** that you write your answer in your own words.

4. **IF THE ANSWERS ARE FOUND TO BE COPIED FRO ANY BOOK DIRECTLY OR WEBSITE, YOUR SCRIPT WILL BE MARKED 0.**

5. **IF ANSWERS OF ASSIGNMENTS ARE FOUND TO BE SIMILAR, THEN ALL THOSE SIMILAR SCRIPTS WILL BE MARKED 0.**

1 Assignments

1. A n-dimensional hypercube Q_n is a simple graph whose vertices are the 2^n points, $(x_1, x_2, \ldots, x_n) \in \mathbb{R}$ so that for each $i \in [n]$, either $x_i = 0$ or $x_i = 1$, and in which two vertices are adjacent if they agree in exactly $n - 1$ coordinates.

   (a) Prove that if $n > 2$, then Q_n has a Hamiltonian cycle.

   (b) Prove that if $n > 2$, then Q_n has at least $\frac{n!}{2}$ Hamiltonian cycles. Find the number of Hamiltonian cycles of Q_3 (the regular, three-dimensional cube).

2. A travelling agent has to visit n cities, each of them $(n + 1)$ times. In how many different ways can he do this if he is not allowed to start and finish in the same city? Find the different ways for travelling if $n = 4$ in the above problem.

3. How many Hamiltonian cycles does K_n have?