**Operations Research-II Class Test**

**Open Time, Open book, Group**

**Due: 15 April, 2025, 6 AM**

***There are two questions. Both questions must be answered. The first question carries 20 marks and second question does not carry any marks. The quality of your prediction in your second question decides how much marks I shall reduce from your question 1’s score.***

1. You are packing your room after your stay at IIT Kharagpur and want to decide which items to place where and transport home. You have two suitcases, one suitable for the cabin baggage (both have finite volume as well as weight restrictions) and another for check in baggage. Remaining things have to be either sent by packers and mover’s ahead of time who charge by volume. Not all items are safe enough to send through packers and movers. Also some items cannot be checked in and some can’t be carried. Keeping these compatibility restrictions in mind.
2. Formulate a Dynamic Programming model to address this problem
3. Formulate an Integer Programming model to address this problem
4. Using the formulated models as backend, create a GUI which accepts user input regarding the item details, costs etc. and provides an optimal packing plan?
5. Compare the performance of DP model and IP model on the sample data available in excel file if the suitcase details are as follows <https://amzn.in/d/5mtN8GH>
6. There is a chessboard which had a white king on e1 and no other pieces. I gave the board with the white piece in its place to three of my students and asked them to play with only this white king. The students take turns and perform a legal move with the king from the current position. Students play this game until they get bored and decide to leave. The last person left wins this game. Students played this game for an entire day and finally reported to me that one person had become the winner. When the game ended, where would the position of the king be? Can you make an educated guess? The quality of your prediction is assessed based on the Euclidean distance between your predicted position and actual position of the king. If the prediction is off by a large Euclidean distance, a proportional cut shall be made from the marks you scored in question 1.