MDSC – 103(P)

Sri Sathya Sai Institute of Higher Learning
(Deemed to be University)
Dept. of Mathematics and Computer Science
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Course: **M.Sc. Data Science and Computing**   Date: **October 10, 2023**
Subject: **Optimization Techniques**   Test: **ESE**, Max.: **30 Marks**

Answer the following:

1. **Wilson Problem**: Wilson Manufacturing produces both baseballs and softballs, which it wholesales to vendors around the country. Its facilities permit the manufacture of a maximum of 500 dozen baseballs and a maximum of 500 dozen softballs each day. The cowhide covers for each ball are cut from the same processed cowhide sheets. Each dozen baseballs require five square feet of cowhide (including waste), whereas, one dozen softballs require six square feet of cowhide (including waste). Wilson has 3600 square feet of cowhide sheets available each day.
   Production of baseballs and softballs includes making the inside core, cutting and sewing the cover, and packaging. It takes about one minute to manufacture a dozen baseballs and two minutes to manufacture a dozen softballs. A total of 960 minutes is available for production daily.
   The prices for a dozen baseball and a dozen softball are 7 and 10 dollars respectively. Answer the following:
   a) Formulate the problem in the Excel file and generate the sensitivity analysis.
   b) Write on cost coefficient sensitivity analysis.
   c) Write on Right Hand Side Sensitivity Analysis.

   (5+7+8=20 Marks)

2. Consider the following problem:
$$f(x_1, x_2) = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$

   a) Write a program to visualize the above function.
   b) Write an iterative program to maximize the function.

   (5+5 = 10 Marks)