



NIIT University

Lab Test

Semester (Aug-Dec 2019)

Subject Code: **CS-4101**

Subject Name: **Linear and Nonlinear Optimisation**

Date: 6.12.2019, Friday

Time: 2:30 pm

Maximum Marks: 30

Instructions:

1. All your answer must be supported by diagrams and equations.
2. While answering the question, indicate question numbers and parts clearly.
3. Submit in A4-size paper, with proper margin space so that it can be stapled to a file.

1. A caterer is booked to cater a banquet each evening for the next T days. He requires r_t clean napkins on t^{th} day for $t = 1, 2, \dots, T$. He may send dirty napkins to laundry, which has two speeds of service-fast and slow. The napkins sent to the fast service will be ready for the next day's banquet; those sent to the slow service will be ready for the banquet two days later. Fast service cost c_1 and slow service cost c_2 per napkin, with $c_1 > c_2$. The caterer may also buy new napkins at any time at cost c_0 per napkin. He has an initial stock of s napkins and wishes to minimise the total cost of supplying fresh napkins.

(a) Formulate the problem as Linear Programming Problem.

(b) Using $T = 4$, $s = 200$, $r_1 = 100$, $r_2 = 130$, $r_3 = 150$, $r_4 = 140$, $c_1 = 6$, $c_2 = 4$, $c_0 = 12$, solve the problem.

2. Find the minima of the function: $f(x) = x^3 + \frac{2\exp(-100x)}{x}$, $x \in (0, 1)$.

3. For function $k(x-7)e^{-m(x-5)^2}$, $x \in (2, 8)$ what is the best methods, in terms of time and accuracy, to find the maxima for

(a) $\frac{m}{k} < 1$.

(b) $\frac{m}{k} = 1$.

(c) $\frac{m}{k} > 1$.