


Name: Enrolment No:			
UPES End Semester Examination, December 2023			
Course: Operation Research & Optimization Program: BTech (CSE-H+NH)-BAO Course Code: CSBA 3004		Semester: V Time : 03 hrs. Max Marks: 100	
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Explain Linear Programming with a small example.	4	CO1
Q 2	Explain Dual Linear Programming with an example.	4	CO1
Q 3	Describe how will you represent variable $x \in \{1,2,3,\dots,10\}$ in terms of sum of boolean variables.	4	CO1
Q 4	Solve the following linear programming problem using geometric method: maximize $5x+10y$ s.t. $x + y \leq 20$ $x \leq 5$ $x,y \geq 0$	4	CO1
Q 5	Discuss briefly with example: When there can be multiple optimum solution of one linear programming problem.	4	CO3
SECTION B (4Qx10M= 40 Marks)			
	Consider x,y as boolean variables for Q6-Q9		
Q 6	Identify how will you linearize XOR operations on two boolean variables.	10	CO2
Q 7	State linear expression for “if x then not y”?	10	CO2
Q 8	Describe the linear expression for boolean expression NOT(x) OR y.	10	CO2
Q 9	Prove that $(x-y)^2$ can be written in linear expression.	10	CO1

	<p>or</p> <p>Prove that any boolean expression can be written in terms of linear expressions.</p>		
<p>SECTION-C (2Qx20M=40 Marks)</p>			
Q 10	<p>Explain Integer Linear Programming for 0-1 Knapsack problem and then discuss how can you solve any problem in NP with Integer Linear Programming.</p>	20	CO3
Q 11	<p>Illustrate Linear programming for fractional Knapsack with example. With the help of the solution of ILP then provide a greedy algorithm for fractional Knapsack.</p> <p>or</p> <p>Explain Integer Linear Programming for Max-3SAT problem.</p>	20	CO4