

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION-OCTOBER-2023

B.Tech-VII Semester

COURSE CODE (CREDITS): 19B1WEC733 (3)

MAX. MARKS: 25

COURSE NAME: Optimization Techniques

COURSE INSTRUCTOR: Dr. Pardeep Garg

MAX. TIME: 1.5 Hours

*Note: (a) All questions are compulsory. (b) Marks are indicated against each question in square brackets. (c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.*

**Q1.** Using Simplex method, solve the following problem: [CO-1, 7 marks]

Max.  $z=2x_1+5x_2+7x_3$ , subject to the constraints:

$$3x_1+2x_2+4x_3 \leq 100, x_1+4x_2+2x_3 \leq 100, x_1+x_2+3x_3 \leq 100, \text{ and } x_1, x_2, x_3 \geq 0.$$

**Q2.** Discuss the steps of two-phase method for solving the LPPs in detail. [CO-1, 3 marks]

**Q3 (i).** There are 10 persons and 10 jobs; each person can perform each job but with varying degree of efficiency. In the context of Optimization techniques, define the nature of this statement. What will be the optimal allocation of a number of tasks (jobs) to an equal number of facilities (persons); how is this problem formulated mathematically, discuss in detail its mathematical formulation. [CO-2, 1+2=3 marks]

**Q3 (ii).** Solve the assignment problem represented by the following matrix shown in Table 1:

Table 1						
	I	II	III	IV	V	VI
A	9	22	58	11	19	27
B	43	78	72	50	63	48
C	41	28	91	37	45	33
D	74	42	27	49	39	32
E	36	11	57	22	25	18
F	3	56	53	31	17	28

[CO-2, 5 marks]

**Q4.** Use penalty (Big-M) method to maximize the following LPP:

Max.  $z=3x_1-x_2$ , subject to the constraints:

$$2x_1+x_2 \geq 2, x_1+3x_2 \leq 3, x_2 \leq 4, \text{ and } x_1, x_2 \geq 0.$$

[CO-1, 7 marks]