BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE **SEMESTER: VI**
BRANCH: IT **SESSION : SP/2019**

SUBJECT : IT6027 OPTIMIZATION TECHNIQUES

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) Define LPP and also give its vector representation. [3]

(b) Put the following problem in standard form. What do you mean by basic feasible solution? [3]

Maximize $Z= 2x_1-3x_2+4x_3$

Subject to

$$x_1 + 2x_2+x_3 \le 8$$
$$2x_1 -x_2 +x_3 \ge 2$$
$$4x_1- 2x_2- 3x_3 = - 6$$

$x_1, x_2 \ge 0$ and x_3 is unrestricted in sign.

Q2 (a) Maximize the objective function [3]

$$Z= 2x_1 + 3x_2$$

Subject to

$$x_1+x_2 \le 1$$
$$3x_1 + x_2 \le 4$$

and $x_1, x_2 \ge 0$

by using graphical method.

(b) Find the set of solutions to [3]

Minimize $Z= 3x_1 + 2x_2 - 5x_3$

and maximize $Z= 2x_1 + 3x_2 + x_3$

respectively,

subject to the constraints $x_1+ 3x_2+ 2x_3= 8$

$2x_1+ 2x_2+ x_3= 5$

and $x_1, x_2, x_3 \ge 0$.

Q3 Maximize $Z = 7x_1 + 12x_2 + 16x_3$ [6]

Subject to

$$2x_1 + x_2 + x_3 + x_4 =1$$
$$x_1 + 2x_2 + 4x_3 + x_5 = 2$$

and $x_1, x_2, x_3, x_4, x_5 \ge 0$.

Q4 Maximize $Z= x_1-x_2 +2x_3$ [6]

Subject to $x_1-x_2 +4X_3 \ge 2$

$$-3x_1+x_2+x_3 \le 8$$
$$-x_1+ 3x_2+2x_3 \ge 4$$

and $x_1, x_2, x_3 \ge 0$.

Q5 Use duality to solve the problem [6]

Maximize $Z = -2x_1 + 3x_2$

Subject to $x_1 \le 6$

$$x_2 \le 4$$
$$x_1+x_2 \le 5$$
$$x_1 \ge 1$$

and $x_1, x_2 \ge 0$

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