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

CLASS: MCA **SEMESTER : V**
BRANCH: MCA **SESSION : MO/19**

SUBJECT: MCA5005 OPTIMIZATION THEORY

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Write opportunities and shorcomings of operation research. [4]

Q.1(b) A company makes two products (X and Y) using two machines (A and B). Each unit of X that is produced requires 50 minutes processing time on machine A and 30 minutes processing time on machine B. Each unit of Y that is produced requires 24 minutes processing time on machine A and 33 minutes processing time on machine B. At the start of the current week there are 30 units of X and 90 units of Y in stock. Available processing time on machine A is forecast to be 40 hours and on machine B is forecast to be 35 hours. The demand for X in the current week is forecast to be 75 units and for Y is forecast to be 95 units. Company policy is to maximise the combined sum of the units of X and the units of Y in stock at the end of the week. Formulate the problem of deciding how much of each product to make in the current week as a linear program. [8]

Q.2(a) Explain corner point method of solving LPP graphically. [4]

Q.2(b) Maximize $z = 3x_1 + 2x_2$ [8]
subject to
$-x_1 + 2x_2 \le 4$
$3x_1 + 2x_2 \le 14$
$x_1 - x_2 \le 3$
$x_1, x_2 \ge 0$

Q.3(a) Show primal dual relationship with example. [4]

Q.3(b) Solve following problem by dual simplex method [8]
Max $Z = -2x1 - x2$
subject to
$-3x1 - x2 \le -3$
$-4x1 - 3x2 \le -6$
$-x1 - 2x2 \le -3$
and $x1, x2 \ge 0$;

Q.4) Solve following using gomory's cut [12]
$z = x_1 + 4x_2$
subject to
$2x_1 + 4x_2 \le 7$
$5x_1 + 3x_2 \le 15$
x_1, x_2 are integers ≥ 0

Q.5(a) Solve following using revised simplex method [8]
Max Z = x1 + 2x2
Subject to x1 + x2 ≤ 3
x1 + 2x2 ≤ 5
3x1 + x2 ≤ 6 and x1, x2 ≥ 0

Q.5(b) Write advantage of using dynamic programming on LPP. [4]

Q.6 Solve given problem using branch and bound method [12]
Maximize $z = 2x_1 + 3x_2$
subject to the constraints :
$6x_1 + 5x_2 \le 25$
$x_1 + 3x_2 \le 10$
$x_1 \ge 0$ and $x_2 \ge 0$ and integers.

Q.7(a) Write steps to solve by wolfe's modified simplex method. [6]

Q.7(b) How to reduce a NLPP to separable form. [6]

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