UNIQUE PAPER CODE : 62361101

NAME OF THE PAPER : Introduction to Operational Research and Linear Programming

NAME OF COURSE : B.A. (Prog.)

SEMESTER : I

DURATION : 3 hours

MAXIMUM MARKS : 75

INSTRUCTIONS FOR CANDIDATES

All Questions carry equal marks.

*Attempt any **four** Questions in all.*

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1. “Executive at all levels in business and industry come across the problems of making a decision at every stage in their day to day activities. Operational Research provides them with various quantitative techniques for decision making and enhances their ability to make long-range plans and solve everyday problems of running a business and industry greater efficiency, competence and confidence”. Comment with examples.

2. A firm is engaged in producing two products A and B. Each unit of product A requires 2 Kgs of raw material and four labor hours of processing, whereas each unit of product B requires 3 Kgs of raw material and three labor hours for the same type. Every week the firm has an availability of 60 Kgs of raw material and 96 labor hours. One unit of product A sold yields Rs 40 and one unit of product B sold gives Rs 35 as profit. Formulate and solve this as a Linear Programming Problem to determine as to how many units of each of the products should be produced per week so that the firm can earn maximum profit.

3. Solve the following linear programming using simplex method

Maximize $Z = 3x_1+9x_2$

Subject to $x_1+4x_2 \leq 8$

$x_1+2x_2 \leq 4$

$x_1, x_2 \geq 0$

4. For the following LPP, solve for (x_1, x_2) using Two Phase Simplex Method

Minimize $Z = 4x_1+x_2$

Subject to $3x_1+x_2 = 3$

$4x_1+3x_2 \geq 6$

$x_1+2x_2 \leq 3$

$x_1, x_2 \geq 0$

5. What is duality in LPP? Give Economic Interpretation of duality. Find the dual of the following linear programming problem

Maximize $Z = x_1 + x_2 + x_3$

Subject to $x_1 - 3x_2+4x_3 = 5$

$x_1 - 2x_2 \leq 3$

$2x_2 - x_3 \geq 4$

$x_1, x_2 \geq 0$, x_3 unrestricted

6. What is meant by ‘Sensitivity Analysis’ in Linear Programming Problem? Consider the LPP

Maximize $Z = 5x_1 + 12x_2 + 4x_3$

Subject to $x_1 + 2x_2 + x_3 \leq 5$

$2x_1 - x_2 + 3x_3 = 2$

$x_1, x_2, x_3 \geq 0$

Solve the LPP and Discuss the effect of changing the requirement vector $[5, 2]^T$ to $[7,2]^T$ on the optimum solution. (Where T indicates transpose of a vector). Which resource should be decreased and by how much to achieve the best marginal increase in the value of the objective function?