UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program : Seventh Semester – Fall 2021

Roll No. ……

Paper: Operation Research **Course Code: STAT-412** **Time: 3 Hrs. Marks: 60**

Q.1. Answer the following short questions: (6x5=30)

a) Define operations research and discuss its role in decision making.
b) Discuss the methods used to solve operation research models.
c) Define linear programming and discuss its properties.
d) Define graphical sensitivity analysis.
e) Define Simplex method. Discuss its main feature and conditions.
f) Discuss the iterative nature of the Simplex method.

Solve the following questions. (3x10=30)

Q2. Solve the following problem using the graphical method.

$$\text{Maximize } Z = 80x_1 + 100x_2$$

subject to

$$x_1 + 2x_2 \leq 720$$
$$5x_1 + 4x_2 \leq 1800$$
$$3x_1 + x_2 \leq 900$$

where

$$x_1, x_2 \geq 0$$

Q3. A carpenter has 90, 80 and 50 running feet respectively of teak, plywood and rosewood. The product A requires 2, 1 and 1 running feet of teak, plywood and rosewood respectively. While the product B requires 1, 2 and 1 running feet of teak, plywood and rosewood respectively. If A would sell for Rs. 480 and B would sell for Rs. 400 per unit, how much of each should be make and sell in order to obtain maximum gross income out of his stock of wood?

i. Give a mathematical formulation to this linear programming problem.
ii. Use graphical method to solve the problem.
iii. Indicate clearly the feasible solution region on the graph.

Q4. Use Simplex method to solve the following problem. Provide the tables for all iterations.

$$\text{Maximize } Z = 3x_1 + 2x_2$$

subject to

$$2x_1 + x_2 \leq 40$$
$$x_1 + x_2 \leq 24$$
$$2x_1 + 3x_2 \leq 60$$

where

$$x_1, x_2 \geq 0$$