



UNIVERSITY OF THE PUNJAB

Seventh Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig.

Roll No. in Words.

PAPER: Operation Research
Course Code: STAT-412 Part-I (Compulsory)

MAX. TIME: 15 Min.

MAX. MARKS: 10

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Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1.(a) Encircle the right answer, cutting and overwriting is not allowed. (5x1=5)

1. All the parameters in linear programming model are assumed to be
a) variables b) constraints c) functions d) None of the above
2. Graphic method can be applied to solve a linear programming problem when there are only ___ variables
a) One b) More than one c) Two d) Three
3. If the feasible region of the linear programming problem is empty, the solution is
a) infeasible b) unbounded c) alternative d) None of the above
4. If there are "m" original variables and "n" introduced (slack) variables, then there will be ___ columns in the simplex table
a) m-n b) m+n+3 c) m+n-1 d) m+n
5. A minimization problem can be converted into a maximization problem by changing the sign of the coefficients in the ___
a) constraints b) Objective function c) Both A and B d) None of the above

Q.1.(b) State whether following statements are True or False. (5x1=5)

- i. Graphical method can be used for more than two decision variables (True/False)
- ii. In simplex Method, the outgoing variable has largest value of θ_i (True/False)
- iii. Business can have unconstrained problems (True/False)
- iv. Definition of Problem is first phase of OR Study (True/False)
- v. Stochastic problem are easier to solve (True/False)



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MAX. TIME: 2 Hrs. 45 Min.

MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Write short and concise answer to the following questions:

(5 x 4 = 20)

- Define OR and briefly discuss its impact on society
- Phases of solving a problem using OR
- Explain the steps involved in setting up of a Simplex method
- Define the following with reference to L.P.P.
 - feasible solution
 - slack variable
- How it is ensured that variables are positive in graphical method.

Q.3. The cut-Right knife company sells sets of kitchen knives. The Basic Set consists of 2 utility knives and 1 chef's knife. The Regular Set consist of 2 utility knives and 1 chef's knife and 1 bread knife. The Deluxe Set consists of 3 utility knives, 1 chef's knife and 1 bread knife. Their profit is \$30 on Basic Set, \$40 on a Regular Set, and \$60 on a Deluxe Set. The factory has on hand 800 utility knives, 400 chef's knives and 200 bread knives. Assuming all sets are sold, how many of set should be sold to maximize the profit. What is the maximum profit?

(10)

Q.4. Provide the graphical solution to following problem

- Minimize $Z = 3X_1 + 8X_2$ subject to
 $X_1 + X_2 \geq 8$; $2X_1 - 3X_2 \leq 0$; $X_1 + 2X_2 \leq 30$; $3X_1 - X_2 \geq 0$; $x_1 \leq 10$; $x_2 \geq 9$; $X_1, X_2 \geq 0$
- Maximize $Z = 80X_1 + 100X_2$ subject to
 $X_1 + 2X_2 \leq 720$; $5X_1 + 4X_2 \leq 1800$; $3X_1 + X_2 \leq 900$; $X_1, X_2 \geq 0$

(7+7)

Q.5. Provide simplex solution to the following problems

$$\begin{aligned} \text{Maximize } Z &= 120X_1 + 40X_2 + 60X_3 \\ \text{Subject to } X_1 + X_2 + X_3 &\leq 100 \\ 10X_1 + 4X_2 + 7X_3 &\leq 500 \\ 2X_1 + 3X_2 + X_3 &\geq 60 \text{ when } x_1, x_2, x_3 \geq 0 \end{aligned}$$

(6)