Department of CSIT, GGV, Bilaspur
Operational Research

Max. Marks: 70 **Time: 2 Hours Course:** **BSc. Semester: V**

Notes: Attempt any 14. All questions having equal marks. Try to use less number of pages.

1. Discuss judgement phase of Operation Research.
2. Explain scope of Operation Research in industry and planning.
3. Elaborate some of the Industrial applications of Linear Programming.
4. A firm can produce three types of cloth, say, A, B and C. Three kinds of wool are required for it, say, red wool, green wool, and blue wool. One unit length of type A cloth needs 2 yards of red wool and 3 yards of blue wool: one unit length of type B cloth needs 3 yards of red wool, 2 yards of green wool and 2 yards of the blue wool: and one unit length of type C cloth needs 5 yards of green wool and 4 yards of blue wool. The firm has a stock of only 8 yards of red wool, 10 yards of green wool and 15 yards of blue wool. It is assumed that the income obtained from one unit length of type A cloth is Rs. 3, of type B cloth is Rs. 5 and that of type C cloth is Rs. 4. Formulate the problem as a linear programming problem.
5. Explain the limitations of Linear Programming Method.
6. What is the canonical form of Linear Programming Problem? Explain it properly.
7. Discuss in brief about management applications of linear programming model.
8. Use graphical method to solve the following problem:

   Maximize $Z = 8x_1 + x2,$
   Subject to $8x_1 + x_2 \leq 8,$
   $2x_1 + x_2 \leq 6,$
   $3x_1 + x_2 \leq 6,$
   $x_1 + 6x_2 \leq 8,$
   $x_1, x_2 \geq 0.$
9. Write steps to solve linear programming problem using Big-M Method.
10. Discuss any five possible special cases in the simplex method.
11. Write some applications of the dual simplex method.
12. Solve the following problem by the simplex method (one iteration only):

    Maximize $Z = 2x_1 + x2,$
    Subject to $x_1 + 2x_2 \leq 10,$
    $x_1 + x_2 \leq 6,$
    $x_1 - x_2 \leq 2,$
    $x_1 - 2x_2 \leq 1,$
    $x_1, x_2 \geq 0.$
13. Explain flow chart of simplex method.
14. Write a note on sensitivity analysis.
15. Explain Dual problem when primal is in canonical form.
16. Write the Algorithm for dual simplex method.
17. Solve the following linear programming problem, using the two phases of the simplex method:

    Minimize $Z = x_1 + x2,$
    Subject to $2x_1 + x_2 \geq 4,$
    $x_1 + 7x_2 \geq 7,$
    $x_1, x_2 \geq 0.$
18. Solve the following problem by dual simplex method (one iteration only):

    Minimize $Z = 20x_1 + 2x2,$
    Subject to $x_1 + x_2 \geq 12,$
    $2x_1 + x_2 \geq 17,$
    $x_1 \geq 2.5,$
    $x_2 \geq 6,$
    $x_1, x_2 \geq 0.$