

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

CLASS: BTECH  
BRANCH: CSE

SEMESTER : V  
SESSION : MO/2025

SUBJECT: CS341 OPTTIMIZATION TECHNIQUES

TIME:02 Hours

FULL MARKS: 25

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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|--|------------|--------|--------|
| Q.1(a) What is Operations Research?  | [2]        | 1      | 1      |
| Q.1(b) A company has three operational departments weaving, processing and packing with capacity to produce three different types of clothes namely suiting, shirting and woolens yielding the profit ₹2, ₹4 and ₹3 per meter respectively. One meter suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minute in packing. Similarly, one meter of shirting requires 4 minutes in weaving, 1 minute in processing and 3 minutes in packing while one meter woolen requires 3 minutes in each department. In a week, total run time of each department is 60, 40 and 80 hours for weaving, processing and packing departments respectively. Formulate the linear programming problem to find the product to maximize the profit. | [3]        | 1,2    | 2      |
| Q.2(a) Describe in brief the scope of Operations Research.   | [2]        | 1      | 2      |
| Q.2(b) Find the minimum of the function $z = 2x - y$ subject to the constraints $x + y \leq 5$ , $x + 2y \geq 8$ ; $x, y \geq 0$ using the graphical method.   | [3]        | 2      | 3      |
| Q.3 Use penalty method to maximize $z = 6x_1 + 4x_2$ subject to the constraints:<br>$2x_1 + 3x_2 \leq 30$ , $3x_1 + 2x_2 \leq 24$ , $x_1 + x_2 \geq 3$ ; $x_1, x_2 \geq 0$   | [5]        | 3      | 3      |
| Q.4 Write the dual of the following linear programming problem:<br>Maximize $z = x_1 - x_2 + 3x_3$ subject to the constraints $x_1 + x_2 + x_3 \leq 10$ , $2x_1 - x_3 \leq 2$ , $2x_1 - 2x_2 + 3x_3 \leq 6$ ; $x_1, x_2, x_3 \geq 0$ .   | [5]        | 2      | 3      |
| Q.5(a) Explain the importance of integer programming problem.<br>Find the optimum integer solution to the following linear programming problem:  | [1]<br>[4] | 1<br>3 | 2<br>3 |
| Q.5(b) Maximize $z = 2x_1 + 2x_2$ subject to the constraints:<br>$5x_1 + 3x_2 \leq 8$ , $x_1 + 2x_2 \geq 4$ , $x_1, x_2 \geq 0$ and are integers.  |            |        |        |

:::23/09/2025:::M