

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

**CLASS: BE
BRANCH: PRODUCTION**

**SEMESTER: III
SESSION : MO/2018**

SUBJECT : PE3003 OPERATIONS RESEARCH

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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Q1 What is operations research? Discuss the significance and scope of O.R in modern management. [5]

Q2 A firm can produce three types of cloth, say: A, B, and C. Three kinds of wool are for it, say: red, green and blue wool. One unit length of type A cloth needs 2 meters of red wool and 3 meters of blue wool; one unit of type B cloth needs 3 meters of red wool, 2meters of green wool and 2 meters of blue wool; and one unit of C type cloth needs 5 meters of green wool and 4 meters of blue wool. The firm has only a stock of 8 meters of red wool, 10 meters of green wool and 15 meters of blue wool. It is assumed that the income obtained from one unit length of type A cloth is Rs. 3.00, of type B cloth is Rs. 5.00, and of type C cloth is Rs. 4.00. Formulate this problem in order to maximize total profit. [5]

Q3 Solve the following LP problem graphically: [5]
 Maximize $Z = 3X + 5Y$
 Subject to Constraints:
 $X + 2Y \leq 2000$
 $X + Y \leq 1500$
 $X \leq 600$
 $x, y \geq 0$

Q4 Solve the problem by simplex method: [5]
 Maximize $Z = 3X_1 + 2X_2 + 5X_3$
 Subject to Constraints:
 $X_1 + 2X_2 + X_3 \leq 430$
 $3X_1 + 2X_3 \leq 460$
 $X_1 + 4X_2 \leq 420$
 $X_1, X_2, X_3 \geq 0$

Q5 Solve the LP problem by using Big-M-method: [5]
 Maximize $Z = 6X_1 + 4X_2$
 Subject to Constraints:
 $2X_1 + 3X_2 \leq 30$
 $3X_1 + 2X_2 \geq 24$
 $X_1 + X_2 \geq 3 \quad X_1, X_2, \geq 0$

Q6 (a) A company has three factories that supply to four marketing areas. The transportation cost of shipping from each factory to each marketing area is given in table below. Factory capacities and market requirements are also given in the table: [5]

MARKETING AREA					
FACTORY	W1	W2	W3	W4	CAPACITY
F1	19	30	50	10	1600
F2	70	30	40	60	1200
F3	40	8	70	20	1700
DEMAND	1000	1500	800	1200	

Find the initial feasible solution by NWCR & VAM method.