



A1+TA1+V1

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST - I - WINTER SEMESTER 2019-2020

Programme Name & Branch:

B.Tech. (BCL, BEM, BME, BMA & BPI)

Course Name Code:

MEE1024

Course Name:

Operations Research

Faculty Name:

Dr.S.Narayanan

Class Number:

VL2019205000837

Exam Duration: 90 mins Maximum Marks: 50

ANSWER ALL QUESTIONS

Section – A $(2 \times 10 = 20 \text{ Marks})$

1.(a) An Air Force is experimenting with three types of bombs P, Q, and R in which three kinds of explosives, viz., A, B, and C will be used. Taking the various factors into account, it has been decided to use the maximum 600 kg of explosive A, at least 480 Kg of explosive B and exactly 540 kg of explosive C. Born's P requires 3, 2, 2 kg, bomb Q requires 1, 4, 3 kg and bomb R requires 4, 2, 3 kg of explosives A, B, and C respectively. Bomb P is estimated to give the equivalent of a 2 ton explosion, bomb Q, a 3 ton explosion and bomb R, a 4 ton explosion respectively. Formulate the LPP for the biggest bang.

(5 marks)

1.(b) Determine the dual form of the problem

Minimize
$$Z = 5x_1 + 2x_2 + x_3$$

Subject to

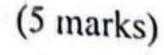
$$2x_1 + 3x_2 + x_3 \ge 20$$

$$6x_1 + 8x_2 + 5x_3 \ge 30$$

$$7x_1 + x_2 + 3x_3 \ge 40$$

$$x_1 + 2x_2 + 4x_3 \ge 50$$

and
$$x_1, x_2, x_3 \ge 0$$



2. Use Two-Phase Simplex method to solve the following LPP.

Maximize
$$z = 5x_1 + 2x_2$$

Subject to

$$2x_1 + x_2 \le 1$$

$$x_1 + 4x_2 \ge 6$$

and
$$x_1, x_2 \ge 0$$

Section – B $(2 \times 15 = 30 \text{ Marks})$

1. Use simplex method to solve the following LPP.

Maximize
$$z = 30x_1 + 40x_2 + 20x_3$$

subject to

$$10x_1 + 12x_2 + 7x_3 \le 10,000$$

$$7x_1 + 10x_2 + 8x_3 \le 8,000$$

$$x_1 + x_2 + x_3 \le 1,000$$
and $x_1, x_2, x_3 \ge 0$

2(a). Determine the IBFS using North-West Corner Rule.

	$\mathbf{D_1}$	D_2	D_3	D_4	D ₅	Supply
A	2	11	10	3	7	4
В	1	4	7	2	1	8
C	3	9	4	8	12	9
Demand	3	3	4	5	6	

(7 marks)

2(b). Obtain the IBFS the following transportation problem using Vogel's Approximation method.

Warehouse					
· · · · · · · · · · · · · · · · · · ·	I	II	m	IV	Supply
A	8	9	6	3	18
В	6	11	5	10	20
C	3	8	7	9	18
Requirement	15	16	12	13	

(8 marks)

