VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

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 x 10 = 20 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. Bomb 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

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

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

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

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

and $x_1, x_2, x_3 \geq 0$

(5 marks)

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

Maximize $z = 5x_1 + 2x_2$

Subject to

$2x_1 + x_2 \leq 1$

$x_1 + 4x_2 \geq 6$

and $x_1, x_2 \geq 0$

Section – B (2 x 15 = 30 Marks)

1. Use simplex method to solve the following LPP.

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

subject to

$10x_1 + 12x_2 + 7x_3 \leq 10{,}000$

$7x_1 + 10x_2 + 8x_3 \leq 8{,}000$

$x_1 + x_2 + x_3 \leq 1{,}000$

and $x_1, x_2, x_3 \geq 0$

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

	D_1	D_2	D_3	D_4	D_5	Supply
A	2	11	10	3	7	4
B	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	Market				Supply
	I	II	III	IV	
A	8	9	6	3	18
B	6	11	5	10	20
C	3	8	7	9	18
Requirement	15	16	12	13	

(8 marks)

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