



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:CIV	Pattern:2023
Name of Course:Operation Research	Course Code:2304306B
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains Three page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1a) Explain the procedure of graphical method for solving linear programming method (6) CO1

Question No. 2

- 2a) Explain with example the procedure for solving n jobs 2 machines problems (6) CO2

Question No. 3

- 3a) Solve the following by (8) CO3
- i) Least Cost method
 - ii) Column Minima Method

Source / Destination	W1	W2	W3	W4	Supply
F1	14	25	45	5	6
F2	65	25	35	55	8
F3	35	3	65	15	16
Demand	4	7	6	13	

OR

- 3b) Five machines are available to do five different jobs. From past records, the time (in hrs) that each machine takes to do each job is known and given in the following table. Find the assignment of machines to jobs that will minimize the total time taken. (8) CO3

Job	I	II	III	IV	V
Destination					
A	2	9	2	7	1
B	6	8	7	6	1

C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

3c) Solve the following by

(8) CO3

i) Least cost method

ii) Row minima method

Source/ Destination	D1	D2	D3	D4	D5	Supply
A	6	4	4	7	5	100
B	5	6	7	4	8	125
C	3	4	6	3	4	175
Demand	60	80	85	105	70	

OR

3d) Consider a job which requires four Activities A,B,C and D. Four workers are employed who can do all these activities. The time required by each of them (in minutes) to perform each of the activities are as follows:

(8) CO3

Activities ↓	Workers ↓			
	1	2	3	4
A	14	12	15	15
B	21	18	18	22
C	14	17	12	14
D	6	5	3	6

How should these activities be assigned to the workers so that the job is completed in minimum time ?

Question No. 4

4a) Minimize $Z=x_1-3x_2-2x_3$

(8) CO4

Subject to constraints

$$3x_1-x_2+2x_3 \geq 7$$

$$-2x_1+4x_2 \leq 12$$

$$-4x_1+3x_2+8x_3 \leq 10$$

Where $x_1, x_2, x_3 \geq 0$

Use simplex method to solve the problem

OR

4b) Use Big M method to

(8) CO4

$$\text{Minimize } Z=3x_1+8x_2$$

Subject to

$$x_1+x_2 = 200$$

$$x_1 \leq 80$$

$$x_2 \geq 60$$

Where $x_1, x_2 \geq 0$

- 4c) Explain the Big M method and simplex method to optimize Linear problems. (8) CO4

OR

- 4d) Discuss the procedure of Two phase method for solving Linear Programming Problem. (8) CO4

Question No. 5

- 5a) Minimize $Z = 3x_1^2 + 4x_2 - 5x_1x_2 - 8x_2$ (8) CO5

subject to constraint $x_1 + x_2 = 4$ by Lagrange's multiplier method

OR

- 5b) Find maximum of $f(x) = x(1.5 - x)$ in the interval of (0,1) within 10% accuracy using Dichotomous Search Technique, $\delta = 0.001$. (8 marks) (8) CO5

- 5c) Maximize $Z = 6x_1 + 8x_2 - x_1^2 - x_2^2$ (8) CO5

subject $4x_1 + 3x_2 = 16$

$3x_1 + 5x_2 = 15$

Where $x_1, x_2 \geq 0$

Solve by Lagrange's multiplier method

OR

- 5d) Using Steepest Gradient method (8) CO5

Maximize $Z = 6x_1 - 2x_1^2 + 4x_2 - 2x_2^2 - 2x_1x_2$ with initial value (1,1). Carry out 2 iterations.

..... End of question paper.....