



LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Com. DEGREE EXAMINATION – ACCOUNTING AND FINANCE

SECOND SEMESTER – APRIL 2025



UAF 2301 – ELEMENTS OF OPERATIONS RESEARCH

Date: 26-04-2025

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A - K1 (CO1)

	Answer ALL the Questions	(10 x 1 = 10)
1.	Answer the following	
a)	Define Operations Research.	
b)	State two importance of OR.	
c)	Contrast the relationship between the manager and OR specialist.	
d)	Recall the meaning on 'Slack Variable'.	
e)	Write the steps involved in LPP formulation.	
2.	MCQ	
a)	Operations research analysts do not a. Predict future operations b. Build more than one model c. Collect relevant data d. Recommend decision and accept	
b)	Linear Programming is a a. Constrained optimization technique b. Technique for economic allocation of limited resource c. Mathematical technique d. All of the above	
c)	To proceed with the Modified Distribution Method algorithm for solving an transportation problem, the number of dummy allocations need to be added are a. n b. n-1 c. 2n-1 d. n-2	
d)	The non basic variables are called a. Shadow cost b. Opportunity cost c. Slack variable d. Surplus variable	
e)	The slack variables indicate a. Excess resource available b. Shortage of resource c. Nil resource d. Idle resource	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	(10 x 1 = 10)
3.	True or False	
a)	OR methods and techniques are only applicable to big enterprises.	
b)	The feasible region of a LP problem with two unknowns may be bounded or unbounded.	

- c) In transportation problems, there are supply constraints for each destination.
- d) Transportation problem applies to situations where a set of commodities is to be transported from source to another.
- e) Two-person zero sum game without saddle point is called pure strategy games.
- 4. Fill in the blanks**
- a) The area of operations research that concentrates on real-world operational problems is known as _____.
- b) While solving a LP graphically the area bounded by the constraints is called _____.
- c) To resolve degeneracy at the initial solution, a very small quantity is allocated in _____ cell.
- d) When the sum of gains of one player is equal to the sum of losses to another player in a game, this situation is known as _____.
- e) For finding an optimum solution in transportation problem _____ method is used.

SECTION B - K3 (CO2)

Answer any TWO of the following in 100 words each.

(2 x 10 = 20)

5. Interpret the following statement – “Mathematics of Operations Research is Mathematics of Optimization”.
6. Draw a feasible region on a graph satisfying the following restraints.
Minimum value function $z = 20x_1 + 10x_2$ subject to
- $$x_1 + 2x_2 \leq 40$$
- $$3x_1 + x_2 \geq 30$$
- $$4x_1 + 3x_2 \geq 60$$
- $$x_1, x_2 \geq 0$$
7. A company has four factories from which it ships its product units to four warehouses W1, W2, W3, and W4 which all the distribution centres. Transportation costs per unit between various combinations of factories (F1, F2, F3, and F4) and warehouses are .
- | Factories | Warehouse | | | | Availabilities |
|--------------|-----------|-----|-----|-----|----------------|
| | W1 | W2 | W3 | W4 | |
| F1 | 48 | 60 | 56 | 58 | 140 |
| F2 | 45 | 55 | 53 | 60 | 260 |
| F3 | 50 | 65 | 60 | 62 | 360 |
| F4 | 52 | 64 | 55 | 61 | 220 |
| Requirements | 200 | 320 | 250 | 210 | |
- Find the initial feasible solution of the above transportation problem by VAM.

8. Solve the game whose pay-off matrix

A	B			
		I	II	III
	I	2	4	11
	II	7	4	2

SECTION C – K4 (CO3)

Answer any TWO of the following in 100 words each.

(2 x 10 = 20)

9. Classify all the basic requirements and their relationships in LPP formulation.

10. Briefly explain the main characteristics of Operations Research.

11. Solve the following game:

(i). Pure strategy:

Player A	Player B			
	12	1	30	-10
	20	3	10	5
	-5	-2	25	0
	15	-4	10	6

(ii). Mixed strategy: $\begin{matrix} 3 & -2 \\ -2 & 5 \end{matrix}$

12. A project work consists of four major jobs for which four major contractors have submitted tenders. The tender documents quoted in thousands of Rupees are given with the matrix as

Jobs					
		J1	J2	J3	J4
Contractors	C1	15	27	35	20
	C2	21	29	33	17
	C3	17	25	37	15
	C4	14	31	39	21

Find the assignment which minimises the total of the project cost. Each contractor has to be assigned one job.

SECTION D – K5 (CO4)

Answer any ONE of the following in 250 words

(1 x 20 = 20)

13. An animal feed company has to produce 200 kgm. Of a feed mixture consisting of two ingredients X1 and X2. X1 costs Rs. 3 per kgm and X2 Rs. 5 per kgm. Not more than 80 kgm of X1 can be used and at least 60 kgm of x2 must be used. Using simplex technique find how much of each ingredient should be used in the mix of the company to minimise cost. Also determine the cost of optimum mix.

14. a). Critically evaluate the scope of the Operations Research. (10 Marks)

b). Following is the pay off matrix for player A (10 Marks)

Player A	Player B					
		B1	B2	B3	B4	B5
	A1	2	4	3	8	4
	A2	5	6	3	7	8
	A3	6	7	9	8	7
	A4	4	2	8	4	2

Using dominance property, obtain the optimum strategies for both the players and determine the value of the game.

SECTION E – K6 (CO5)

Answer any ONE of the following in 250 words

(1 x 20 = 20)

15. Formulate your own LPP model in maximization profit with suitable real-life cases.

16. Construct the optimality solution to the following transportation problem.

Destinations	Origins				Requirement
	A	B	C	D	
1	7	4	3	4	15
2	3	2	7	5	25
3	4	4	3	7	20
4	9	7	5	3	40
Availability	12	8	35	25	80/100
