



Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD) [now MoE]
Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore-641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – August 2025
Semester – III

Class : II UG
Major: Information Technology

Time: 2 Hrs.
Max. Marks: 60

23BMAGE6 Operations Research

Course Outcomes:

On completion of course, the students will be able to

1. Understand the mathematical tools needed to solve optimization problems
2. Find optimum solutions for transportation problems.
3. Apply assignment algorithm to solve travelling salesman problems.
4. Construct Mathematical models for the real-time situations.
5. Apply optimum sequence algorithm for smooth functioning of an industry.

Part –A

6x1=6

Answer ALL the questions

1. The word linear stands for ----- CO1K3
 - a) indicating that all relationships involved in a particular problem
 - b) value of a decision variable
 - c) use of available resource
 - d) uncertainty of optimum value
2. Linear Programming problem must have a _____ CO1K2
 - a) objective that we aim to maximize or minimize
 - b) constraints that we need to specify
 - c) decision variables that we need to determine
 - d) all of the above
3. A constraint in an LP model restricts: CO1K2
 - a) Value of the objective function
 - b) value of the decision variable
 - c) use of the available resources
 - d) all of the above
4. The transportation problem deals with the transportation of CO2K2
 - a) a single product from several sources to a destination
 - b) a multi-product from several sources to several destinations
 - c) a single product from several sources to several destinations
 - d) a single product from a source to several destinations
5. The initial solution of a transportation problem obtained by CO2K3
 - a) North-west corner rule would invariably be optimum
 - b) Least cost method does not provide the least cost solution to a transportation problem
 - c) VAM would invariably be very near to optimum solution
 - d) MODI method is infeasible.
6. In an assignment problem involving four workers and three jobs, total number of assignments possible are CO3K3
 - a) 4
 - b) 3
 - c) 7
 - d) 12

Part-B

Answer ALL the questions

3x6=18

7.a. Explain the meaning of LPP stating its uses and give its limitations.

CO1K3

(or)

7.b. Consider the linear programme:

$$\begin{aligned} \text{Minimize} \quad & z = -3x_1 + x_2 + x_3 \\ \text{subject to} \quad & x_1 - 2x_2 + x_3 \leq 11, \\ & -4x_1 + x_2 + 2x_3 \geq 3, \\ & 2x_1 - x_3 = -1, \\ & x_1 \geq 0, x_2 \geq 0, x_3 \geq \text{or} < 0. \end{aligned}$$

Cast it in standard form, adding variables and/or constraints if necessary. How many decisions variable and constraints are present in this problem?

CO1K2

8. a. State and prove the necessary and sufficient condition for the existence of a feasible solution to the general transportation problem.

CO2K3

(or)

8. b. Obtain an initial basic feasible region, to the following transportation problem, using North – West Corner rule.

CO2K4

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

9.a. Use graphical method to solve the following LPP:

$$\begin{aligned} \text{Minimize} \quad & z = 6x_1 + x_2 \\ \text{subject to} \quad & 2x_1 + x_2 \geq 3, \\ & x_2 - x_1 \geq 0, \\ \text{and} \quad & x_1 \geq 0, x_2 \geq 0. \end{aligned}$$

CO1K4

(or)

9.b. A departmental head has four tasks and three subordinates, the subordinates differ in efficiency. The estimate of the time, each subordinate would take to perform each task, is given below in the matrix. How should he allocate the tasks one to each men, so as to minimize the total man-hours?

CO3 K4

Tasks	Men		
	1	2	3
I	9	26	15
II	13	27	6
III	35	20	15
V	18	30	20

Part-C

3x12=36

Answer ALL the questions

10. a. Consider the following problem faced by a production planner in a soft drink plant. He has two bottling machines A and B. A is designed for 8-ounce bottles and B for 16-ounce bottles. However, each can be used on both types with some loss of efficiency. The following data is available:

Machine	8 ounce bottles	16 ounce bottles
A	100 / minute	40 / minute
B	60 / minute	75 / minute

Each machine can be run 8 hours per day, 5 days per week. Profit on a 8-ounce bottle is 25 paise and on a 16-ounce bottle is 35 paise. Weekly production of the drink cannot exceed 3,00,000 ounces and the market can absorb 25,000 ,8-ounce bottles and 7,000 16-ounce bottles per week. The planner wishes to maximize his profit subject, of course, to all the production and marketing restrictions. Formulate this as a linear programming problem. CO1K4

(or)

10. b. A farm is engaged in breeding pigs. The pigs are fed on various products grown on the farm. In view of the need to ensure certain nutrient constituents (call them X,Y and Z), it is necessary to buy two additional products say A and B. One unit of product A contains 36 units of X, 3 units of Y and 20 units of Z. One unit of product B contains 6 units of X, 12 units of Y and 10 units of Z. The minimum requirements of X, Y and Z is 108 units, 36 units and 100 units respectively. Product A costs Rs.20 per unit and product B Rs.40 per unit.

Formulate the above as a linear programming problem to minimize the total cost and solve the problem by using graphic method. CO1K3

11. a. Obtain an initial basic feasible region, to the following transportation problem, using matrix minima method. CO2K3

	D ₁	D ₂	D ₃	D ₄	Capacity
O ₁	1	2	3	4	6
O ₂	4	3	2	0	8
O ₃	0	2	2	1	10
Demand	4	6	8	6	

(or)

- 11.b. Find the starting solution in the following transportation by VAM and also obtain the optimum solution. CO2K4

	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	3	7	6	4	5
S ₂	2	4	3	2	2
S ₃	4	3	8	5	3
Demand	3	3	2	2	

12. a. ABC limited has three production shop supplying a product to 5 warehouses. The cost of production varies from shop to shop and cost of transportation from one shop to a warehouse also varies. Each shop has a specific production capacity and each warehouse has certain amount of requirement. The costs of transportation are as given below:

Shop	Warehouse					Supply
	I	II	III	IV	V	
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	400

The cost of manufacture of the product at different production shops is :

Shop	Variable Cost	Fixed cost
A	14	7000
B	16	4000
C	15	5000

Find the optimum quantity to be supplied from each shop to different warehouses at minimum total cost.

CO2K3

(or)

12.b. A departmental head has four subordinates, and four tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His of the time each men would take to perform each task, is given in the matrix below.

Tasks	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated, one to a man, so as to minimize the total man-hours?

CO3K4

No. of Copies : 63