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DEEMED TO BE UNIVERSITY
THANJAVUR KUMBAKONAM CHENNAI

School of Arts, Science, Humanities and Education (SASHE)
FIRST CIA Test – February 2024
Course Code:MAT330R01
Course Name: OPERATIONS RESEARCH
Duration: 90 minutes Max Marks: 50

PART A [5×2 = 10 Marks]

Answer all the questions:

1. Write the procedure for forming an LPP.
2. Define the following
   (i) Basic feasible solution (ii) Optimum basic feasible solution
3. Define Pseudo-optimal solution.
4. Write a few important steps for the BIG M method.
5. How to form an initial LPP in Phase II from the Two-phase simpl method.

PART B [4×10 = 40 Mark

Answer all the questions:

6. Use graphical method to solve the following LPP:
   $Minimize\ Z = -x_1 + 2x_2$
   subject to the constraints:
   $$-x_1 + 3x_2 \leq 10,$$
   $$x_1 + x_2 \leq 6,$$
   $$x_1 - x_2 \leq 2,$$
   $$x_1, x_2 \geq 0.$$
7. Solve the following LPP by using Simplex method:
   $Maximize\ Z = 10x_1 + 15x_2$
   subject to
   $$2x_1 + x_2 \leq 26;$$
   $$2x_1 + 4x_2 \leq 56;$$
   $$-x_1 + x_2 \leq 5; \text{ and } x_1, x_2 \geq 0.$$

8. Use the Big-M (Penalty) method to solve the following LPP:

Minimize $Z = 5x_1 + 3x_2$ subject to the constraints

$$2x_1 + 4x_2 \leq 12;$$
$$2x_1 + 2x_2 \leq 10;$$
$$5x_1 + 2x_2 \geq 5;$$
and $x_1, x_2 \geq 0.$

9. (a) Explain the special case of Multiple optimal solution and an unbounded solution.

(b) Use graphical method to solve the following LPP:

Maximize $Z = 10x_1 + 6x_2$ subject to the constraints:

$$5x_1 + 3x_2 \leq 30,$$
$$x_1 + 2x_2 \leq 18, \text{ and } x_1, x_2 \geq 0.$$

Further investigate the special case of LPP.

End of Question Paper

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School of Arts, Science, Humanities and Education (SASHE)
SECOND CIA Test – MARCH 2024
Course Code:MAT330R01
Course Name: OPERATIONS RESEARCH
Duration: 90 minutes Max Marks: 50

PART-A [5×2 = 40 Marks]

Answer all the questions:

1. Define Basic Feasible Solution (BFS) to the transportation problem.
2. Define degenerate and non-degenerate in transportation problems.
3. What do you mean by balanced and unbalanced transportation problems?
4. Give any two differences of the Transportation problem and the Assignment Problem.
5. Write the mathematical formulation of an assignment problem..

PART B [4×10 = 40 Marks]

Answer ANY FOUR questions:

6. Obtain an initial basic feasible solution to the following transportation problem using the NORTH-WEST Corner rule:

	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	

12200

7. Obtain an optimum basic feasible solution to the following transportation problem.

	B_1	B_2	B_3	B_4	B_5	Supply
A_1	5	8	6	6	3	8
A_2	4	7	7	6	5	5
A_3	8	4	6	6	4	9
Demand	4	4	5	4	8	

B1

8. Obtain an optimal basic feasible solution to the transportation problem given in the following table:

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	

735

9. Write an algorithm for the Hungarian method.

10. A company is faced with the problem of assigning four different salesmen to four territories for promoting its sales. Territories are not equally rich in their sales potential and the salesmen also differ in their ability to promote sales. The following table gives the expected annual sales (in thousand of rupees) for each salesman if assigned to various territories. Find the assignment of salesmen so as to maximize the annual sales.

Territories

Salesmen

	T_1	T_2	T_3	T_4
S_1	60	50	40	30
S_2	40	30	20	15
S_3	40	20	35	10
S_4	30	30	25	20

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End of Question Paper

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School of Arts, Science, Humanities and Education (SASHE)
THIRD CIA Test – APRIL 2024
Course Code : MAT330R01
Course Name : OPERATIONS RESEARCH
Duration : 90 minutes Max Marks: 50

PART-A [5×2 = 10 Marks]

Answer all the questions:

1. Define Pseudo-optimal solution.
2. Define (i) Activity and Dummy activity, (ii) Network of a project.
3. Write the formula for Economic Order Quantity (EOQ).
4. What is the minimum average cost of purchasing a model with no shortage?
5. For a deterministic queueing model, arrival rate should ___ the service rate.

PART B [2×15 = 30 Marks]

Answer the following questions:

6. A pineapple firm produces two products: canned pineapple and canned juice. The specific amounts of material, labour and equipment required to produce each product and the availability of each of these resources are shown in the table given below

	Canned Juice	Canned Pineapple	Available resources
Labour (Man hours)	3	2.0	12.0
Equipment (M/c hours)	1	2.3	6.9
Material (Unit)	1	1.4	4.9

Assuming one unit of canned juice and canned Pineapple has profit margins Rs. 2 and Rs. 1 respectively.

(a) Formulate this as a L.P.P. (8)

(b) Solve it graphically (7)

[OR]

7. (a) Write an Algorithm for the Big-M (Penality) method. (8)

(b) Use the Big M method to solve the following LPP:

Minimize $Z = 5x_1 + 3x_2$ subject to the constraints

$2x_1 + 4x_2 \leq 12$; $2x_1 + 2x_2 \leq 10$; $5x_1 + 2x_2 \geq 5$;

and $x_1, x_2 \geq 0$. (7)

8. A company operating 50 weeks in a year is concerned about its stocks of copper cable. This costs Rs. 240 a metre and there is a demand for 8,000 metres a week. Each replenishment costs Rs. 1250 for administration and Rs. 1,750 for delivery, while holding costs are estimated at 25 percent of value held a year. Assuming no shortages are allowed, what is the optimal inventory policy for the company? (8)

How would this analysis differ if the company wanted to maximize profit rather than minimize cost? What is the gross profit if the company sell cable for Rs. 360 a metre. (7)

[OR]

9. (a) Explain types of Inventory cost. (8)

(b) A manufacturing company purchases 9000 parts of a machine for its annual requirements, ordering one month usage at a time. Each part cost Rs. 20. The ordering cost per order is Rs. 15 and the carrying charges are 15% of the average inventory per year. You have been asked to suggest a more economical purchasing policy for the company. What advice would you offer, and how much would it save the company per year? (7)

PART - C

Answer the following question: **[1×10 = 10 Marks]**

10. Calculate the earliest start, earliest finish, latest start, and latest finish of each activity of the project given below and determine the critical path of the project.

Activity	1 – 2	1 – 3	1 – 5	2 – 3	2 – 4	3 – 1	3 – 5	3 – 6	4 – 6	5 – 6
Duration (in weeks)	8	7	12	4	10	3	5	10	7	4

End of Question Paper