2011000305030049
EXAMINATION OCTOBER 2024
BACHELOR OF SCIENCE (FIFTH SEMESTER)
OPERATION RESEARCH-I - LEVEL 3

[Time: As Per Schedule] **[Max. Marks:50]**

Instructions:
1. Fill up strictly the following details on your answer book
   a. Name of the Examination: **BACHELOR OF SCIENCE (FIFTH SEMESTER)**
   b. Name of the Subject: **OPERATION RESEARCH-I- LEVEL 3**
   c. Subject Code No: **2011000305030049**
2. Sketch neat and labelled diagram wherever necessary.
3. Figures to the right indicate full marks of the question.
4. All questions are compulsory.

Seat No:

Student's Signature

Q.1 Answer the following **14**

(1) Full form of VAM
(2) What are the fundamental differences between linear programming and integer programming?
(3) Under what conditions can we establish that a game is strictly determinable?
(4) Define: Saddle Point
(5) What is feasible region in LPP?
(6) Explain transportation problem. Is this a linear programming problem?
(7) What is degeneracy in a transportation problem?

Q.2 Answer the following. (Any Two) **12**

1) A farmer owns a 120-acre farm and wants to maximize profit by deciding how much land to allocate to growing tomatoes, potatoes, and onions. The selling prices are Rs. 1.50 per kg for tomatoes, Rs. 1.00 per kg for potatoes, and Rs. 2.50 per kg for onions. The average yield per acre is 2500 kg for tomatoes, 3500 kg for potatoes, and 1200 kg for onions. Fertilizer costs Rs. 0.75 per kg, with requirements of 120 kg per acre for tomatoes, 90 kg per acre for potatoes, and 60 kg per acre for onions. Labor costs Rs. 25.00 per man-day, and labor requirements are 6 man-days per acre for tomatoes, 7 man-days per acre for potatoes, and 5 man-days per acre for onions. A total of 700 man-days of labour are available. Formulate this problem as a Linear Programming Problem (LPP) to maximize profit.

2) Solve using simplex method:

Max Z = 6+ 4,

Subject to -2

3

and, ≥0

3) Solve using simplex method:

Max

Subject to

+ 6

- 2

-21

, ≥ 0

Q.3 Answer the following. (Any Two) **12**

1) Solve the following assignment problem using the Hungarian algorithm to minimize the total processing time. The processing time in hours of doing the job in different machine is given below:

Jobs	Machines		
s	A	B	C
1	11	16	21
2	20	13	17
3	13	15	12

2) Solve following LPP using graphically method

Max Z=+3.

Subject to,

and, ≥0

3) Obtain the optimal solution of the following assignment problem.

	a	b	c	d	e
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

Q.4 Answer the following. (Any Two) **12**

1) The payoff matrix of a game is given. Find the solution of the game to the player A and B.

	B1	B2	B3
A1	1	9	2
A2	8	5	4

2) A company has five jobs V, W, X, Y and Z and five machines A, B, C, D and E. The given matrix shows the return in Rs. of assigning a job to a machine. Assign the jobs to machines so as to maximize the total returns.

	A	B	C	D	E
V	32	38	40	28	40
W	40	24	28	21	36
X	41	27	33	30	27
Y	22	38	41	36	36
Z	29	33	40	35	39

3) Find the saddle point of payoff matrix and find the value of a game. Check whether the game is fair or not?

	B1	B2	B3	B4
A1	3	2	4	0
A2	2	4	2	4
A3	4	2	4	0
A4	0	4	0	8

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