

Bachelor of Rural Studies (BRS) (Honours) Examination, 2019

Semester-IV

Rural Studies

Paper - 24

(Basic Mathematics for Rural Studies-II)

(For Back Candidates)

Time: Three Hours

Full Marks: 40

Questions are of value as indicated in the margin.

Answer **any five** questions.

5×8=40

1. A manufacturer of patent medicines is preparing a production plan on Medicines A and B. There are sufficient ingredients available to make 20000 bottles of A and 40000 bottles of B, but there are only 45000 bottles into which either of the medicines can be put. Furthermore it takes three hours to prepare enough material to fill 1000 bottles of A, it takes one hour to prepare enough material to fill 1000 bottles of B and there are 66 hours available for this operation. The profit is Rs. 8.00 per bottle of A and Rs. 7.00 per bottles of B.

Formulate this as an linear programming problem to maximize the profit.

2. Make a graphical representation of the set of constraints in the following LPP:

$$\text{Maximize } z = 2x_1 + x_2$$

$$\text{Sub to, } x_1 + 3x_2 \leq 15$$

$$3x_1 - 4x_2 \leq 12$$

$$x_1, x_2 \geq 0.$$

and find the corner points, feasible solutions and the optimal solutions of the region of feasible solutions.

3. Find all the basic feasible solutions of the equations.

$$2x_1 + 6x_2 + 2x_3 + x_4 = 3$$

$$6x_1 + 4x_2 + 4x_3 + 6x_4 = 2$$

$$x_1, x_2, x_3, x_4 \geq 0$$

4. (a) Show that the vectors (2, 4, 10) and (3, 6, 15) are linearly dependent.
(b) Show that the vectors (1, 2, 3) and (4, -2, 7) are linearly independent.
(c) Find the basic solution with x_3 as non-basic variable.

3+2+3

$$x_1 + 4x_2 - x_3 = 3$$

$$5x_1 + 2x_2 + 3x_3 = 4.$$

P.T.O.

(2)

5. Solve the following game whose payoff matrix is given by:

3+5

(a)

		B			
		I	II	III	IV
A	I	-5	3	1	20
	II	5	5	4	6
	III	-4	-2	0	-5

(b) B

		III	
A	I	0	2
	II	1	-1

6. Use dominance to reduce the payoff matrix and solve the game

2	2	1	-2	-3
4	3	4	-2	0
5	1	2	5	6

7. Solve graphically the games whose payoff matrix is given by

	B ₁	B ₂
A ₁	1	-3
A ₂	3	5
A ₃	-1	6
A ₄	4	1
A ₅	2	2
A ₆	-5	0
