## UG-472 BMS-09

B.Sc. DEGREE EXAMINATION – JANUARY 2009.

(AY - 2005-06 and CY - 2006 batches only)

Third Year

Mathematics

## LINEAR PROGRAMMING AND OPERATIONS RESEARCH

Time: 3 hours

Maximum marks: 75

SECTION A —  $(5 \times 5 = 25 \text{ marks})$ 

Answer any FIVE questions.

1. Write the following linear programming problem in standard form.

Minimize  $Z = 2x_1 - 3x_2 + x_3$ Subject to  $-x_1 + 3x_2 \le -5$  $x_1 + 2x_2 + x_3 \le 6$  $x_1 + x_2 + x_3 \ge -8$  $x_1, x_2, x_3 \ge 0.$ 

2. Explain the term artificial variables and its use in linear programming.

Explain the primal-dual relationship. 3.

Give the mathematical formulation 4. of an assignment problem. How does it differ from a transportation problem?

um.com 5. Obtain an initial basic feasible solution to the following transportation problem by using North West Corner Rule.

	D	$\mathbf{E}$	$\mathbf{F}$	G	Available
А	11	13	17	14	250
В	16	18	14	10	300
С	21	24	13	10	400
Requirement	200	225	275	250	

terms in inventory 6. Explain the following management.

- Carrying cost (a)
- (b) Shortage cost.

What is replacement? Describe some important 7. replacement situations.

Explain : Minimax and Maximin principle used in 8. the theory of games.

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SECTION B —  $(5 \times 10 = 50 \text{ marks})$ 

Answer any FIVE questions.

Let  $S = x_1, x_2, \dots, x_n \subseteq \mathbb{R}^n$ . Then prove that the set 9. of all convex combinations of  $x_1$ ,  $x_2$ .... $x_n$  is a convex set in  $\mathbb{R}^n$ .

Use simplex method to solve the following LPP : 10.

> Maximize  $Z = 3x_1 + 2x_2$ Subject to  $x_1 - x_2 \le 1$  $3x_1 - 2x_2 \le 6$  $x_1, x_2 \ge 0.$

rich Solve the following assignment problem which 11. minimises the total man hours.

		Α	В	С	D	
	1	18	26	17	11	
Jobs	2	13	28	14	26	
	3	38	19	18	15	
	4	19	26	24	10)	
		$\sim$				

Solve the following unbalanced transportation 12.problem.



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13. Neon lights in an industrial park are replaced at the rate of 100 units per day. The physical plant orders the neon lights periodically. It costs Rs. 100 to initiate a purchase order. A neon light kept in storage is estimated to cost about Re. 02 per day. The lead time between placing and receiving an order is 12 days. Determine the optimum inventory policy for ordering the neon lights.

14. The cost of a machine is Rs. 6,100 and its scrap value is only Rs. 100. The maintenance costs are found from experience to be :

Year : 1 2 3 7 8 4 5 6 Maintenance 2000 cost: 100 250400 600 900 12501600

When should the machine be replaced?

15. Find out the optimum strategies for the following  $2 \times 2$  game without saddle point.



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