

Roll No. ....

## BCA-404(O)

### B. C. A. (Fourth Semester) EXAMINATION, May 2013

(Old Course)

Paper Fourth

### OPERATIONS RESEARCH

Time : Three Hours ]

[ Maximum Marks : 75

Note : Section A is compulsory. Attempt *seven* questions out of ten questions from Section B and *one* question from Section C.

#### Section - A

1. Solve the following problem graphically :

Maximize :  $Z = 2x_1 + 3x_2$

Subject to the constraints :

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$$x_1 + x_2 \leq 1$$

$$3x_1 + x_2 \leq 4$$

and  $x_1, x_2 \geq 0$ .

2. How should the jobs be assigned to various machines so that total cost is minimized ?

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	$M_1$	$M_2$	$M_3$	$M_4$
$J_1$	5	7	11	6
$J_2$	8	5	9	6
$J_3$	4	7	10	7
$J_4$	10	4	8	3

## Section - B

3. A resourceful home decorator manufactures two types of lamps say A and B. Both the lamps go through two techniques first a cutter, second a finisher. Lamp A requires 2 hours of the cutter's time and 1 hour of the finisher's time. Lamp B requires 1 hour of cutter's time and 2 hours of the finisher's time. The cutter has 104 hours and finisher 76 hours of available time each month. Profit on lamp A is ₹ 6 and one lamp B is ₹ 11. Assuming that he can sell all that he produces, formulate this problem as an LPP. 6
4. Explain the following terms : 6
- Basic feasible solution
  - Optimal solution.
5. What is degeneracy in transportation problem ? How to overcome it ? 6
6. Define the following terms : 6
- Slack variable
  - Surplus variable
  - Artificial variable
7. Find the initial basic feasible solution of the following Transportation problem by Vogel's approximation method : 6

		Warehouse				Capacity
		W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	
Factory	F <sub>1</sub>	19	30	50	10	7
	F <sub>2</sub>	70	30	40	60	9
	F <sub>2</sub>	40	8	70	20	18
		5	8	7	14	
		Demand				

8. What is Operations Research ? Describe briefly its applications. 6
9. Solve the following LPP by using Simplex method : 6  
Maximize :

$$z = 5x_1 + 3x_2$$

Subject to the constraints :

$$3x_1 + 5x_2 \leq 15$$

$$5x_1 + 2x_2 \leq 10$$

and  $x_1, x_2 \geq 0$ .

10.

		To				
		E	F	G	H	I
From	A	8	10	12	17	15
	B	15	13	18	11	9
	C	14	20	6	10	13
	D	13	19	7	6	12

The present allocation is as the follows : 6

A to E 90, A to F 10, B to F 150, C to F 10, C to G 50, C to I 120, D to H 210, D to I 70. Check if this allocation is optimum. If not, find an optimum schedule.

11. Describe a method of drawing minimum no. of lines in the context of assignment problem. 6
12. Briefly explain Monte-Carlo method of simulation. 6

## Section - C

13. Solve the following LPP using big M method. 15

Minimize :

$$z = x_1 + x_2$$

Subject to the constraints :

$$2x_1 + x_2 \geq 4$$

$$x_1 + 7x_2 \geq 7$$

and  $x_1, x_2 \geq 0$ .

14. Solve the following LPP by resolving degeneracy :

Minimize :

$$z = 5x_1 + 3x_2$$

Subject to :

$$x_1 + x_2 \leq 2;$$

$$5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12$$

and  $x_1, x_2 \geq 0$ .