NEW

2015

BCA

4th Semester Examination

OPERATIONS RESEARCH

PAPER—2203

Full Marks : 100

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any *seven* questions.

1. Solve the following L.P.P. by Simplex method :

Maximize $Z = 3x_1 + 2x_2$

Subject to : $x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

$x_1, x_2 \geq 0.$ 10

2. Use penalty (Big-M) method, solve the following L.P.P. :

Maximize $Z = 3x_1 - x_2$

Subject to : $2x_1 + x_2 \geq 2$

$x_1 + 3x_2 \leq 3$

$x_2 \leq 4$

$x_1, x_2 \geq 0.$ 10

3. Solve the problem by two-phase method :

Minimize $Z = x_1 + x_2$

Subject to : $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

$x_1, x_2 \geq 0.$ 10

4. Prove that dual of the dual of a given primal is the primal. 10

5. Apply the principle of duality to solve the LP problem :

Maximize $Z = 3x_1 - 2x_2$

Subject to : $x_1 + x_2 \leq 5$

$x_1 \leq 4$

$1 \leq x_2 \leq 6$

$x_1, x_2 \geq 0.$ 10

6. Solve the following problem by dual simplex method :

Minimize $Z = 2x_1 + x_2$

Subject to : $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \geq 3$

$x_1, x_2 \geq 0.$ 10

7. Solve the following transportation problem using Vogel's Approximation Method (VAM) : 10

	D_1	D_2	D_3	D_4	a_i
O_1	10	7	3	6	3
O_2	1	6	8	3	5
O_3	7	4	5	3	7
b_j	3	2	6	4	

8. Find the optimal assignments to find the minimum costs for the assignment problem with the following Cost matrix : 10

	I	II	III	IV	V
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16
E	10	13	11	8	16

9. Solve the following game problem using dominance principle : 10

Player B

Player A		I	II	III	IV	V
	I	3	5	4	9	6
	II	5	6	3	7	8
	III	8	7	9	8	7
	IV	4	2	8	5	3

10. The following table lists the jobs of a network along with their time estimates :

Job (i→j)	Time duration (days)		
	Optimistic (a)	*Most likely* (m)	*Pessimistic (b)*
1 → 2	3	6	15
1 → 6	2	5	14
2 → 3	6	12	30
2 → 4	2	5	8
3 → 5	5	11	17
4 → 5	3	6	15
6 → 7	3	9	27
5 → 8	1	4	7
7 → 8	4	19	28

Draw the project network and calculate the length and variance of the critical path. 10

[Internal Assessment — 30]