2019

BCA

4th Semester Examination

Operations Research

Paper – 2203

Full Marks – 70

Time : 3 Hours

The questions are of equal value for any group / half.

The figures in the 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 graphically : 10

Maximize $Z = 5x_1 + 7x_2$

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

$x_1 + x_2 \leq 2$

$2x_1 \leq 3$

$x_1, x_2 \geq 0$

2. Use two phase method to solve the LPP : 10

Minimize $Z = 3x_1+2x_2$

Subject to $2x_1+ x_2 \geq 14$

$2x_1+ 3x_2 \geq 22$

$x_1+x_2 \geq 1$

$x_1,x_2 \geq 0$

3. Using VAM solve the transportation problem : 10

	D_1	D_2	D_3	ai
O_1	50	30	220	1
O_2	90	45	170	3
O_3	250	200	50	4
bj	4	2	2	

4. Solve the assignment problem with the following profit-matrix : 10

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

5. A Company has six jobs. All the jobs have to go through two machine . The time required for the jobs on each machine in hours is given below. Find the optimum sequence that minimizes the total elapsed time. 10

Job	A	B	C	D	E	F
Machine I	1	4	6	3	5	2
Machine II	3	6	8	8	1	5

6. Solve the integer programming problem : 10

Maximize $Z = x_1 + 2x_2$

Subject to $2x_2 \leq 7$

$x_1 + x_2 \leq 7$

$2x_1 \leq 11$

$x_1, x_2 \geq 0$

x_1, x_2 are integers.

7. (a) Write down the role of computers in Operations Research. 2

(b) Solve the following LPP by Simplex Method : 8

Maximize $Z = 3x_1 + x_2 + 3x_3$

Subject to $2x_1 + x_2 + x_3 \leq 2$

$x_1 + 2x_2 + 3x_3 \leq 5$

$2x_1 + x_3 \leq 6$

$x_1, x_2, x_3 \geq 0$

8. Consider the job-machine assignment problem of 4 jobs and 4 machines. The assignment cost in Rs. are given in the following table. Find the optimal cost of assignment. 10

Jobs →	→ Machines I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

9. (a) Define critical path of a project network. Write down differences between PERT & CPM. 2+3

(b) Construct a network of a project whose activites and their precedence relationship are given below : 5

Activity	A	B	C	D	E	F	G	H	I
Immediate predecessor	–	A	A	–	D	B, C,E	F	D	G, H

10. A small project is composed on seven activites, whose time estimates are listed in the table as follows : 10

Activity	Estimated Duration (Weeks)		
	Optimistic	Most likely	Pessimistic
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

You are required to :

(i) Draw the project network.

(ii) Find the expected duration and variance of each activity.

(iii) Calculate the earliest and latest occurrence of each event and expected project length.

[Internal Assessment : 30 Marks]