Data sets of the benchmark instances for the interval-stochastic multi-mode resource investment project scheduling problem (IS-MRIPSP):

Problem instance#1:
Projects: 1
Jobs (including source/sink): 7
Horizon: [0, 24]
Resources:
 - Renewable: 1 R
 - Nonrenewable: 1 N
Project Information:

Pronr.	#jobs	Rel.date	Sample size	Probability level (L)	Probability level (U)
1	5	0	10	95%	95%

Precedence Relations:

Jobnr.	#modes	#successors	successors
1	1	3	2, 3, 4
2	2	1	5
3	1	1	6
4	2	1	6
5	1	1	7
6	2	1	7
7	1	0	

Requests/Durations:

Jobnr.	mode	duration	R1	N1
1	1	[0, 0]	[0, 0]	[0, 0]
2	1	[3, 5]	[1, 2]	[2, 4]
	2	[4, 8]	[0, 2]	[1, 2]
3	1	[1, 2]	[1, 2]	[0, 1]
4	1	[2, 4]	[2, 4]	[2, 5]
	2	[4, 6]	[0, 1]	[1, 3]
5	1	[1, 3]	[1, 2]	[0, 1]
6	1	[1, 3]	[1, 3]	[2, 4]
	2	[3, 5]	[1, 2]	[1, 3]
7	1	[0, 0]	[0, 0]	[0, 0]

Non-renewable Resource Availabilities:
N1   Normal ~ ([14, 16], [1, 3])
Reliability factors of renewable resources:
Reliability factor (R1): [90%, 100%]
Efficiency factors of renewable resources on each job:

Resource	Jobnr.	Efficiency factor
R1	1	[100%, 100%]
	2	[90%, 100%]
	3	[80%, 90%]
	4	[90%, 95%]
	5	[85%, 100%]
	6	[80%, 90%]
	7	[100%, 100]

Unit usage cost of renewable resources (R1): [30, 50]

Problem instance#2:
Projects: 1
Jobs (including source/sink): 12
Horizon: [0, 58]
Resources:
  - Renewable: 2 R
  - Nonrenewable: 2 N
Project Information:

Pronr.	#jobs	Rel.date	Sample size	Probability level (L)	Probability level (U)
1	10	0	10	90%	90%

Precedence Relations:

Jobnr.	#modes	#successors	successors
1	1	3	2 3 4
2	2	3	5 6 7
3	3	1	6
4	2	1	7
5	1	2	8 11
6	2	2	9 11
7	3	2	10 11
8	2	1	9
9	1	1	12
10	2	1	12
11	3	1	12
12	1	0	

Requests/Durations:

Jobnr.	mode	duration	R1	R2	N1	N2
1	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]
2	1	[1, 3]	[0, 2]	[4, 8]	[2, 5]	[0, 1]
	2	[2, 4]	[3, 6]	[0, 2]	[0, 1]	[4, 9]
3	1	[1, 3]	[0, 1]	[3, 5]	[0, 2]	[6, 9]
	2	[2, 5]	[4, 8]	[0, 1]	[5, 9]	[0, 2]
	3	[4, 6]	[3, 5]	[0, 1]	[4, 7]	[0, 1]
4	1	[1, 2]	[0, 2]	[5, 8]	[6, 9]	[0, 1]
	2	[2, 4]	[6, 8]	[0, 1]	[3, 6]	[0, 1]
5	1	[2, 3]	[5, 8]	[0, 2]	[0, 1]	[2, 4]
6	1	[2, 3]	[6, 10]	[0, 1]	[4, 6]	[0, 0]
	2	[4, 6]	[4, 8]	[0, 2]	[0, 0]	[5, 9]
7	1	[1, 2]	[4, 6]	[0, 1]	[5, 8]	[0, 1]
	2	[1, 2]	[4, 6]	[0, 0]	[0, 1]	[4, 6]
	3	[5, 7]	[1, 3]	[0, 1]	[0, 0]	[1, 2]
8	1	[2, 4]	[4, 8]	[0, 0]	[0, 1]	[7, 10]
	2	[5, 8]	[0, 2]	[4, 6]	[0, 1]	[6, 10]
9	1	[4, 6]	[0, 0]	[5, 7]	[0, 2]	[0, 4]
10	1	[1, 3]	[0, 1]	[3, 5]	[6, 8]	[0, 1]
	2	[3, 6]	[2, 5]	[0, 3]	[0, 0]	[5, 7]
11	1	[3, 5]	[4, 6]	[0, 1]	[5, 7]	[0, 0]
	2	[4, 6]	[0, 1]	[2, 4]	[0, 1]	[1, 3]
	3	[5, 8]	[2, 4]	[0, 1]	[0, 0]	[1, 3]
12	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]

Non-renewable Resource Availabilities:
N1   Normal ~ ([40, 43], [3, 5])
N2   Normal ~ ([48, 52], [2, 4])
Reliability factors of renewable resources:
Reliability factor (R1): [85%, 95%]
Reliability factor (R2): [90%, 100%]
Efficiency factors of renewable resources on each job:

Resource	Jobnr.	Efficiency factor	Resource	Jobnr.	Efficiency factor
R1	1	[100%, 100%]	R2	1	[100%, 100%]
	2	[90%, 100%]		2	[80%, 90%]
	3	[80%, 90%]		3	[90%, 95%]
	4	[90%, 95%]		4	[95%, 100%]
	5	[85%, 100%]		5	[85%, 100%]
	6	[80%, 90%]		6	[80%, 100%]
	7	[90%, 100%]		7	[90%, 100%]
	8	[85%, 95%]		8	[80%, 90%]
	9	[80%, 100%]		9	[90%, 95%]
	10	[95%, 100%]		10	[85%, 95%]
	11	[80%, 90%]		11	[90%, 100%]
	12	[100%, 100%]		12	[100%, 100%]

Unit usage cost of renewable resources (R1): [20, 40]
Unit usage cost of renewable resources (R2): [30, 50]

Problem instance#3:
Projects: 1
Jobs (including source/sink): 20
Horizon: [0, 83]
Resources:
  - Renewable: 2 R
  - Nonrenewable: 2 N
Project Information:

Pronr.	#jobs	Rel.date	Sample size	Probability level (L)	Probability level (U)
1	18	0	10	95%	95%

Precedence Relations:

Jobnr.	#modes	#successors	successors
1	1	3	2, 3, 4
2	3	3	5, 6, 7
3	3	3	6, 8, 9
4	3	1	6
5	3	3	8, 14, 17
6	3	3	13, 14, 15
7	3	3	10, 12, 17
8	3	2	11, 15
9	3	3	15, 17, 19
10	3	2	13, 14
11	3	1	12
12	3	2	13, 18
13	3	1	16
14	3	1	18
15	3	1	18
16	3	1	19
17	3	1	20
18	3	1	20
19	3	1	20
20	1	0	

Requests/Durations:

Jobnr.	mode	duration	R1	R2	N1	N2
1	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]
2	1	[1, 2]	[3, 5]	[0, 0]	[4, 6]	[0, 0]
	2	[3, 5]	[0, 0]	[2, 4]	[1, 3]	[0, 0]
	3	[4, 6]	[0, 0]	[3, 5]	[0, 0]	[3, 5]
3	1	[2, 4]	[0, 0]	[2, 3]	[0, 0]	[4, 6]
	2	[2, 4]	[0, 0]	[4, 6]	[0, 0]	[3, 5]
	3	[3, 5]	[4, 6]	[0, 0]	[0, 0]	[0, 1]
4	1	[2, 4]	[0, 0]	[2, 5]	[0, 0]	[1, 2]
	2	[1, 4]	[1, 2]	[0, 0]	[0, 0]	[4, 6]
	3	[3, 5]	[0, 0]	[4, 6]	[5, 7]	[0, 0]
5	1	[0, 1]	[0, 0]	[1, 3]	[3, 5]	[0, 0]
	2	[2, 3]	[6, 9]	[0, 0]	[2, 4]	[0, 0]
	3	[4, 6]	[3, 5]	[0, 0]	[0, 0]	[2, 4]
6	1	[1, 2]	[5, 8]	[0, 0]	[0, 0]	[0, 1]
	2	[2, 4]	[0, 0]	[7, 10]	[0, 0]	[0, 1]
	3	[2, 4]	[0, 0]	[6, 10]	[4, 6]	[0, 0]

7	1	[0, 1]	[7, 10]	[0, 0]	[0, 0]	[4, 6]
	2	[0, 1]	[0, 0]	[3, 4]	[0, 0]	[4, 6]
	3	[1, 2]	[8, 10]	[0, 0]	[0, 0]	[3, 5]
8	1	[2, 3]	[6, 9]	[0, 0]	[0, 0]	[7, 10]
	2	[2, 3]	[0, 0]	[2, 4]	[4, 6]	[0, 0]
	3	[3, 4]	[6, 9]	[0, 0]	[0, 0]	[6, 9]
9	1	[1, 2]	[3, 5]	[0, 0]	[0, 0]	[3, 5]
	2	[1, 3]	[2, 3]	[0, 0]	[0, 1]	[0, 0]
	3	[4, 6]	[0, 0]	[3, 4]	[0, 0]	[4, 5]
10	1	[1, 3]	[2, 3]	[0, 0]	[0, 0]	[5, 8]
	2	[2, 4]	[0, 0]	[6, 9]	[2, 3]	[0, 0]
	3	[2, 4]	[0, 0]	[5, 7]	[3, 5]	[0, 0]
11	1	[1, 3]	[3, 5]	[0, 0]	[0, 0]	[5, 7]
	2	[3, 5]	[3, 5]	[0, 0]	[0, 0]	[3, 5]
	3	[3, 5]	[3, 5]	[0, 0]	[1, 3]	[0, 0]
12	1	[1, 2]	[0, 1]	[0, 0]	[0, 0]	[2, 4]
	2	[2, 3]	[0, 0]	[6, 9]	[3, 5]	[0, 0]
	3	[2, 3]	[0, 0]	[7, 10]	[0, 0]	[1, 2]
13	1	[0, 1]	[0, 0]	[3, 4]	[0, 0]	[5, 7]
	2	[2, 3]	[4, 6]	[0, 0]	[0, 0]	[5, 7]
	3	[4, 5]	[0, 0]	[1, 3]	[0, 0]	[3, 5]
14	1	[1, 2]	[6, 8]	[0, 0]	[0, 0]	[5, 7]
	2	[3, 4]	[0, 0]	[7, 9]	[3, 4]	[0, 0]
	3	[5, 6]	[0, 0]	[6, 8]	[1, 2]	[0, 0]
15	1	[1, 2]	[0, 0]	[3, 4]	[0, 0]	[6, 8]
	2	[1, 2]	[5, 7]	[0, 0]	[0, 0]	[6, 8]
	3	[3, 4]	[0, 0]	[2, 4]	[0, 0]	[1, 3]
16	1	[1, 3]	[0, 0]	[2, 3]	[7, 9]	[0, 0]
	2	[1, 3]	[0, 1]	[0, 0]	[6, 9]	[0, 0]
	3	[1, 3]	[3, 5]	[0, 0]	[5, 8]	[0, 0]
17	1	[2, 3]	[0, 0]	[5, 6]	[6, 7]	[0, 0]
	2	[3, 5]	[0, 0]	[1, 2]	[3, 4]	[0, 0]
	3	[4, 6]	[1, 3]	[0, 0]	[1, 3]	[0, 0]
18	1	[0, 1]	[0, 0]	[6, 7]	[8, 9]	[0, 0]
	2	[1, 2]	[5, 7]	[0, 0]	[3, 5]	[0, 0]
	3	[2, 3]	[0, 0]	[5, 7]	[1, 2]	[0, 0]
19	1	[1, 2]	[0, 0]	[6, 7]	[7, 8]	[0, 0]
	2	[3, 4]	[0, 0]	[4, 6]	[0, 0]	[3, 5]
	3	[4, 6]	[0, 0]	[3, 5]	[5, 7]	[0, 0]
20	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]

Non-renewable Resource Availabilities:
N1   Normal ~ ([38, 40], [1, 3])
N2   Normal ~ ([42, 45], [2, 4])
Reliability factors of renewable resources:
Reliability factor (R1): [80%, 90%]
Reliability factor (R2): [85%, 100%]

Efficiency factors of renewable resources on each job:

Resource	Jobnr.	Efficiency factor	Resource	Jobnr.	Efficiency factor
R1	1	[100%, 100%]	R2	1	[100%, 100%]
	2	[90%, 100%]		2	[80%, 90%]
	3	[80%, 90%]		3	[90%, 95%]
	4	[90%, 95%]		4	[95%, 100%]
	5	[85%, 100%]		5	[85%, 100%]
	6	[80%, 90%]		6	[80%, 100%]
	7	[90%, 100%]		7	[90%, 100%]
	8	[85%, 95%]		8	[80%, 90%]
	9	[80%, 100%]		9	[90%, 95%]
	10	[95%, 100%]		10	[85%, 95%]
	11	[80%, 90%]		11	[90%, 100%]
	12	[90%, 100%]		12	[80%, 90%]
	13	[80%, 100%]		13	[95%, 100%]
	14	[85%, 100%]		14	[80%, 100%]
	15	[80%, 90%]		15	[80%, 90%]
	16	[85%, 95%]		16	[95%, 100%]
	17	[95%, 100%]		17	[90%, 95%]
	18	[90%, 95%]		18	[95%, 100%]
	19	[85%, 100%]		19	[95%, 100%]
	20	[100%, 100%]		20	[100%, 100%]

Unit usage cost of renewable resources (R1): [10, 20]
Unit usage cost of renewable resources (R2): [20, 40]

Problem instance#4:
Jobs (including source/sink): 22
Horizon: [0, 110]
Resources:
  - Renewable: 2 R
  - Nonrenewable: 3 N
Project Information:

Pronr.	#jobs	Rel.date	Sample size	Probability level (L)	Probability level (U)
1	20	0	5	95%	95%

Precedence Relations:

Jobnr.	#modes	#successors	successors
1	1	3	2, 3, 4
2	3	3	6, 9, 14
3	3	3	5, 8, 11
4	3	3	12, 16, 20
5	3	2	9, 17
6	3	3	7, 12, 18
7	3	2	8, 17
8	3	2	15, 16
9	3	3	10, 13, 16
10	3	2	12, 20
11	3	3	14, 15, 19
12	3	2	19, 21
13	3	1	15
14	3	1	18
15	3	1	21
16	3	1	21
17	3	1	19
18	3	1	20
19	3	1	22
20	3	1	22
21	3	1	22
22	1		

Requests/Durations:

Jobnr.	mode	duration	R1	R2	N1	N2	N3
1	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]
2	1	[1, 2]	[0, 0]	[5, 7]	[0, 0]	[6, 9]	[1, 2]
	2	[3, 4]	[5, 7]	[0, 0]	[0, 0]	[7, 9]	[0, 0]
	3	[5, 6]	[4, 6]	[0, 0]	[0, 0]	[7, 9]	[0, 1]
3	1	[1, 1]	[0, 0]	[1, 2]	[3, 4]	[0, 0]	[3, 5]
	2	[3, 5]	[0, 0]	[1, 2]	[0, 0]	[1, 3]	[2, 4]
	3	[5, 7]	[0, 0]	[0, 1]	[2, 4]	[0, 0]	[0, 0]
4	1	[2, 3]	[7, 9]	[0, 0]	[0, 0]	[3, 5]	[0, 1]
	2	[3, 5]	[5, 7]	[0, 0]	[7, 9]	[0, 0]	[1, 2]
	3	[5, 6]	[0, 0]	[1, 2]	[0, 0]	[1, 3]	[1, 2]
5	1	[1, 2]	[0, 0]	[1, 3]	[0, 0]	[1, 2]	[0, 0]
	2	[2, 4]	[0, 0]	[2, 3]	[7, 9]	[0, 0]	[2, 3]
	3	[5, 6]	[0, 0]	[1, 2]	[6, 8]	[0, 0]	[1, 2]
6	1	[1, 1]	[0, 0]	[2, 4]	[6, 9]	[0, 0]	[3, 5]
	2	[2, 4]	[0, 0]	[2, 4]	[5, 8]	[0, 0]	[2, 4]

	3	[3, 4]	[0, 0]	[1, 2]	[4, 6]	[0, 0]	[1, 2]
7	1	[0, 2]	[0, 0]	[6, 10]	[0, 0]	[7, 10]	[0, 0]
	2	[2, 4]	[0, 0]	[6, 9]	[0, 0]	[1, 2]	[1, 2]
	3	[5, 6]	[0, 0]	[6, 9]	[3, 5]	[0, 0]	[0, 0]
8	1	[1, 1]	[5, 7]	[0, 0]	[6, 9]	[0, 0]	[2, 4]
	2	[2, 3]	[3, 5]	[0, 0]	[3, 5]	[0, 0]	[1, 2]
	3	[3, 4]	[2, 4]	[0, 0]	[0, 0]	[4, 6]	[0, 0]
9	1	[3, 5]	[0, 0]	[6, 9]	[0, 0]	[1, 3]	[3, 5]
	2	[5, 6]	[0, 0]	[6, 9]	[0, 0]	[1, 2]	[2, 4]
	3	[6, 7]	[0, 0]	[5, 7]	[0, 0]	[1, 2]	[1, 2]
10	1	[1, 1]	[0, 0]	[4, 6]	[0, 0]	[7, 10]	[1, 2]
	2	[1, 2]	[0, 0]	[3, 5]	[0, 0]	[2, 4]	[0, 1]
	3	[2, 3]	[0, 0]	[1, 3]	[0, 0]	[4, 6]	[0, 0]
11	1	[1, 2]	[0, 0]	[2, 4]	[0, 0]	[2, 4]	[2, 3]
	2	[2, 4]	[1, 3]	[0, 0]	[0, 0]	[1, 2]	[1, 2]
	3	[3, 4]	[0, 1]	[0, 0]	[1, 3]	[0, 0]	[0, 1]
12	1	[1, 2]	[0, 0]	[2, 4]	[0, 0]	[6, 9]	[3, 5]
	2	[2, 3]	[2, 4]	[0, 0]	[0, 0]	[5, 8]	[2, 4]
	3	[3, 4]	[0, 0]	[1, 3]	[1, 3]	[0, 0]	[1, 2]
13	1	[1, 2]	[5, 7]	[0, 0]	[0, 0]	[3, 5]	[0, 0]
	2	[3, 5]	[4, 6]	[0, 0]	[0, 0]	[2, 4]	[0, 1]
	3	[5, 6]	[0, 0]	[4, 6]	[0, 0]	[1, 2]	[0, 0]
14	1	[1, 2]	[4, 6]	[0, 0]	[0, 0]	[3, 4]	[5, 7]
	2	[3, 5]	[1, 2]	[0, 0]	[3, 5]	[0, 0]	[2, 3]
	3	[4, 6]	[0, 0]	[1, 2]	[3, 4]	[0, 0]	[0, 1]
15	1	[1, 1]	[0, 0]	[0, 1]	[3, 5]	[0, 0]	[0, 2]
	2	[2, 3]	[1, 3]	[0, 0]	[2, 5]	[0, 0]	[0, 1]
	3	[3, 4]	[1, 2]	[0, 0]	[1, 2]	[0, 0]	[0, 0]
16	1	[2, 3]	[0, 0]	[2, 4]	[1, 3]	[0, 0]	[2, 3]
	2	[5, 6]	[0, 0]	[1, 3]	[0, 0]	[1, 3]	[1, 2]
	3	[5, 6]	[0, 0]	[0, 1]	[1, 3]	[0, 0]	[0, 0]
17	1	[2, 3]	[5, 7]	[0, 0]	[0, 0]	[5, 7]	[3, 4]
	2	[4, 6]	[0, 0]	[6, 9]	[0, 1]	[0, 0]	[2, 3]
	3	[5, 7]	[0, 0]	[5, 8]	[0, 0]	[2, 4]	[0, 0]
18	1	[3, 5]	[1, 2]	[0, 0]	[5, 9]	[0, 0]	[2, 4]
	2	[3, 5]	[0, 0]	[1, 2]	[0, 0]	[1, 3]	[0, 0]
	3	[3, 5]	[3, 5]	[0, 0]	[0, 0]	[2, 5]	[0, 0]
19	1	[1, 3]	[1, 3]	[0, 0]	[0, 0]	[3, 5]	[1, 2]
	2	[4, 6]	[0, 1]	[0, 0]	[0, 0]	[2, 4]	[0, 1]
	3	[5, 6]	[0, 0]	[2, 4]	[1, 2]	[0, 0]	[0, 0]
20	1	[1, 2]	[0, 0]	[3, 5]	[2, 5]	[0, 0]	[1, 2]
	2	[4, 6]	[4, 6]	[0, 0]	[1, 3]	[0, 0]	[0, 1]
	3	[5, 6]	[1, 3]	[0, 0]	[0, 0]	[2, 5]	[0, 0]
21	1	[2, 3]	[5, 7]	[0, 0]	[6, 8]	[0, 0]	[5, 8]
	2	[4, 6]	[4, 6]	[0, 0]	[2, 4]	[0, 0]	[2, 4]
	3	[5, 7]	[2, 3]	[0, 0]	[1, 2]	[0, 0]	[0, 0]
22	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]

Non-renewable Resource Availabilities:
N1   Normal ~ ([70, 80], [3, 5])
N2   Normal ~ ([80, 85], [5, 8])
N3   Normal ~ ([60, 65], [2, 4])
Reliability factors of renewable resources:
Reliability factor (R1): [75%, 95%]
Reliability factor (R2): [80%, 100%]

Efficiency factors of renewable resources on each job:

Resource	Jobnr.	Efficiency factor	Resource	Jobnr.	Efficiency factor
R1	1	[100%, 100%]	R2	1	[100%, 100%]
	2	[80%, 100%]		2	[80%, 90%]
	3	[70%, 90%]		3	[80%, 95%]
	4	[90%, 95%]		4	[85%, 100%]
	5	[85%, 100%]		5	[75%, 100%]
	6	[80%, 90%]		6	[70%, 100%]
	7	[80%, 100%]		7	[90%, 100%]
	8	[85%, 95%]		8	[80%, 90%]
	9	[85%, 100%]		9	[90%, 95%]
	10	[95%, 100%]		10	[75%, 95%]
	11	[70%, 90%]		11	[80%, 100%]
	12	[85%, 100%]		12	[80%, 90%]
	13	[80%, 100%]		13	[95%, 100%]
	14	[95%, 100%]		14	[80%, 100%]
	15	[80%, 90%]		15	[70%, 90%]
	16	[75%, 95%]		16	[85%, 100%]
	17	[95%, 100%]		17	[90%, 95%]
	18	[90%, 95%]		18	[95%, 100%]
	19	[85%, 100%]		19	[95%, 100%]
	20	[90%, 100%]		20	[85%, 100%]
	21	[80%, 95%]		21	[90%, 100%]
	22	[100%, 100%]		22	[100%, 100%]

Unit usage cost of renewable resources (R1): [20, 30]
Unit usage cost of renewable resources (R2): [30, 50]

Problem instance#5:
Projects: 1
Jobs (including source/sink): 32
Horizon: [0, 183]
Resources:
  - Renewable: 2 R
  - Nonrenewable: 2 N
Project Information:

Pronr.	#jobs	Rel.date	Sample size	Probability level (L)	Probability level (U)
1	30	0	5	90%	90%

Precedence Relations:

Jobnr.	#modes	#successors	successors
1	1	3	2, 3, 4
2	3	3	5, 6, 7
3	3	3	18, 20, 26
4	2	3	6, 8, 9
5	3	3	10, 13, 27
6	3	1	21
7	3	2	8, 19
8	2	3	16, 23, 25
9	3	3	11, 19, 25
10	3	1	31
11	3	3	12, 13, 15
12	2	1	14
13	3	1	31
14	3	2	23, 24
15	3	3	16, 17, 22
16	2	1	26
17	3	2	24, 27
18	3	2	24, 30
19	3	2	23, 26
20	3	1	22
21	2	2	22, 25
22	3	1	28
23	3	1	29
24	2	1	28
25	3	2	28, 30
26	3	2	27, 31
27	3	2	29, 30
28	3	1	29
29	2	1	32
30	3	1	32
31	3	1	32
32	1		

Requests/Durations:

Jobnr.	mode	duration	R1	R2	N1	N2
1	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]
2	1	[2, 4]	[0, 0]	[6, 8]	[7, 9]	[0, 0]
	2	[3, 6]	[0, 0]	[5, 7]	[0, 1]	[0, 0]

	3	[5, 8]	[0, 0]	[2, 3]	[0, 0]	[2, 4]
3	1	[2, 4]	[5, 7]	[0, 0]	[0, 0]	[4, 7]
	2	[3, 5]	[4, 6]	[0, 0]	[0, 0]	[3, 5]
	3	[5, 7]	[2, 5]	[0, 0]	[0, 0]	[1, 2]
4	1	[2, 3]	[2, 3]	[0, 0]	[0, 0]	[3, 5]
	2	[3, 5]	[1, 2]	[0, 0]	[0, 0]	[0, 1]
5	1	[1, 2]	[0, 0]	[3, 5]	[0, 0]	[5, 7]
	2	[1, 3]	[6, 9]	[0, 0]	[0, 0]	[4, 6]
	3	[4, 6]	[6, 9]	[0, 0]	[5, 7]	[0, 0]
6	1	[2, 3]	[0, 0]	[3, 5]	[3, 5]	[0, 0]
	2	[4, 5]	[0, 0]	[1, 2]	[0, 0]	[4, 6]
	3	[4, 5]	[0, 0]	[2, 4]	[2, 5]	[0, 0]
7	1	[1, 1]	[0, 0]	[6, 9]	[0, 0]	[4, 6]
	2	[2, 4]	[0, 0]	[4, 6]	[0, 0]	[4, 6]
	3	[3, 5]	[3, 5]	[0, 0]	[0, 0]	[4, 5]
8	1	[3, 5]	[6, 9]	[0, 0]	[0, 0]	[5, 7]
	2	[4, 6]	[6, 9]	[0, 0]	[2, 4]	[0, 0]
9	1	[1, 2]	[4, 7]	[0, 0]	[3, 5]	[0, 0]
	2	[2, 4]	[3, 5]	[0, 0]	[2, 4]	[0, 0]
	3	[5, 7]	[0, 0]	[6, 10]	[2, 3]	[0, 0]
10	1	[2, 4]	[0, 0]	[2, 4]	[0, 0]	[5, 8]
	2	[4, 6]	[0, 0]	[2, 4]	[0, 0]	[2, 4]
	3	[4, 6]	[7, 10]	[0, 0]	[5, 7]	[0, 0]
11	1	[1, 1]	[0, 0]	[5, 8]	[0, 0]	[4, 7]
	2	[3, 5]	[0, 0]	[5, 8]	[2, 4]	[0, 0]
	3	[4, 7]	[1, 3]	[0, 0]	[1, 2]	[0, 0]
12	1	[3, 5]	[4, 6]	[0, 0]	[2, 3]	[0, 0]
	2	[4, 7]	[4, 6]	[0, 0]	[0, 0]	[4, 6]
13	1	[1, 2]	[0, 0]	[3, 5]	[0, 0]	[7, 10]
	2	[3, 4]	[4, 6]	[0, 0]	[0, 0]	[4, 6]
	3	[5, 7]	[0, 0]	[2, 4]	[0, 0]	[3, 5]
14	1	[3, 4]	[5, 7]	[0, 0]	[6, 9]	[0, 0]
	2	[5, 6]	[0, 0]	[5, 8]	[0, 0]	[3, 5]
	3	[5, 7]	[4, 6]	[0, 0]	[6, 9]	[0, 0]
15	1	[1, 2]	[3, 6]	[0, 0]	[1, 3]	[0, 0]
	2	[2, 4]	[0, 0]	[2, 4]	[0, 0]	[1, 3]
	3	[5, 7]	[2, 4]	[0, 0]	[0, 0]	[1, 3]
16	1	[2, 4]	[0, 0]	[4, 6]	[6, 8]	[0, 0]
	2	[4, 6]	[2, 4]	[0, 0]	[4, 7]	[0, 0]
17	1	[1, 2]	[3, 5]	[0, 0]	[4, 6]	[0, 0]
	2	[3, 5]	[0, 0]	[2, 3]	[0, 0]	[3, 6]
	3	[5, 7]	[1, 3]	[0, 0]	[3, 6]	[0, 0]
18	1	[1, 1]	[0, 0]	[7, 9]	[0, 0]	[1, 3]
	2	[2, 4]	[0, 0]	[5, 7]	[4, 7]	[0, 0]
	3	[3, 6]	[0, 0]	[3, 5]	[2, 4]	[0, 0]
19	1	[1, 2]	[0, 0]	[4, 6]	[5, 7]	[0, 0]
	2	[2, 3]	[4, 6]	[0, 0]	[4, 6]	[0, 0]

	3	[3, 4]	[1, 3]	[0, 0]	[0, 0]	[5, 8]
20	1	[1, 2]	[3, 6]	[0, 0]	[2, 4]	[0, 0]
	2	[3, 5]	[0, 0]	[1, 3]	[2, 4]	[0, 0]
	3	[5, 7]	[2, 4]	[0, 0]	[0, 0]	[5, 9]
21	1	[2, 3]	[0, 0]	[2, 4]	[0, 0]	[2, 4]
	2	[4, 5]	[3, 5]	[0, 0]	[0, 0]	[1, 2]
22	1	[0, 1]	[4, 6]	[0, 0]	[5, 7]	[0, 0]
	2	[1, 2]	[1, 3]	[0, 0]	[2, 4]	[0, 0]
	3	[4, 7]	[0, 1]	[0, 0]	[1, 2]	[0, 0]
23	1	[1, 1]	[6, 9]	[0, 0]	[7, 10]	[0, 0]
	2	[3, 5]	[3, 5]	[0, 0]	[4, 8]	[0, 0]
	3	[4, 7]	[0, 0]	[2, 4]	[5, 8]	[0, 0]
24	1	[1, 2]	[1, 2]	[0, 0]	[0, 0]	[6, 9]
	2	[2, 4]	[0, 0]	[3, 5]	[5, 8]	[0, 0]
25	1	[2, 4]	[6, 9]	[0, 0]	[4, 6]	[0, 0]
	2	[5, 7]	[0, 0]	[1, 2]	[0, 0]	[1, 2]
	3	[6, 8]	[5, 9]	[0, 0]	[0, 0]	[1, 2]
26	1	[1, 2]	[5, 9]	[0, 0]	[0, 0]	[7, 10]
	2	[2, 4]	[0, 0]	[5, 8]	[4, 6]	[0, 0]
	3	[2, 4]	[3, 5]	[0, 0]	[0, 0]	[2, 4]
27	1	[1, 2]	[0, 0]	[5, 7]	[4, 8]	[0, 0]
	2	[3, 5]	[6, 9]	[0, 0]	[3, 5]	[0, 0]
	3	[4, 7]	[1, 3]	[0, 0]	[3, 5]	[0, 0]
28	1	[3, 5]	[6, 9]	[0, 0]	[4, 7]	[0, 0]
	2	[3, 5]	[6, 9]	[0, 0]	[0, 0]	[1, 3]
	3	[5, 7]	[5, 8]	[0, 0]	[4, 6]	[0, 0]
29	1	[1, 3]	[5, 7]	[0, 0]	[4, 8]	[0, 0]
	2	[2, 5]	[0, 0]	[5, 9]	[4, 8]	[0, 0]
30	1	[2, 4]	[0, 0]	[0, 1]	[0, 0]	[5, 8]
	2	[3, 5]	[3, 5]	[0, 0]	[4, 7]	[0, 0]
	3	[3, 5]	[1, 3]	[0, 0]	[0, 0]	[4, 6]
31	1	[1, 2]	[5, 9]	[0, 0]	[2, 4]	[0, 0]
	2	[2, 4]	[2, 4]	[0, 0]	[0, 0]	[5, 9]
	3	[2, 4]	[1, 4]	[0, 0]	[2, 4]	[0, 0]
32	1	[0, 0]	[0, 0]	[0, 0]	[0, 0]	[0, 0]

Non-renewable Resource Availabilities:
N1   Normal ~ ([115, 120], [8, 10])
N2   Normal ~ ([90, 100], [10, 15])

Reliability factors of renewable resources:
Reliability factor (R1): [85%, 100%]
Reliability factor (R2): [70%, 95%]

Efficiency factors of renewable resources on each job:

Resource	Jobnr.	Efficiency factor	Resource	Jobnr.	Efficiency factor
R1	1	[100%, 100%]	R2	1	[100%, 100%]
	2	[70%, 90%]		2	[70%, 85%]
	3	[80%, 90%]		3	[85%, 95%]
	4	[70%, 90%]		4	[75%, 95%]
	5	[75%, 90%]		5	[85%, 100%]
	6	[90%, 100%]		6	[80%, 95%]
	7	[70%, 95%]		7	[80%, 95%]
	8	[95%, 100%]		8	[90%, 100%]
	9	[75%, 90%]		9	[70%, 85%]
	10	[85%, 95%]		10	[85%, 95%]
	11	[80%, 95%]		11	[90%, 100%]
	12	[85%, 100%]		12	[70%, 90%]
	13	[70%, 90%]		13	[85%, 100%]
	14	[85%, 100%]		14	[70%, 90%]
	15	[70%, 95%]		15	[80%, 95%]
	16	[85%, 95%]		16	[95%, 100%]
	17	[85%, 100%]		17	[80%, 95%]
	18	[80%, 95%]		18	[85%, 100%]
	19	[85%, 100%]		19	[85%, 100%]
	20	[80%, 95%]		20	[75%, 90%]
	21	[70%, 90%]		21	[80%, 95%]
	22	[85%, 100%]		22	[70%, 90%]
	23	[90%, 100%]		23	[90%, 100%]
	24	[70%, 95%]		24	[85%, 100%]
	25	[85%, 95%]		25	[75%, 90%]
	26	[75%, 95%]		26	[80%, 95%]
	27	[85%, 95%]		27	[85%, 100%]
	28	[80%, 100%]		28	[75%, 90%]
	29	[75%, 95%]		29	[80%, 95%]
	30	[70%, 90%]		30	[85%, 100%]
	31	[90%, 100%]		31	[75%, 90%]
	32	[100%, 100%]		32	[100%, 100%]

Unit usage cost of renewable resources (R1): [33, 55]
Unit usage cost of renewable resources (R2): [20, 40]