

## Data of fuzzy job shop scheduling and location problem

**Tables A.1 to A.2: Transportation time and set up time for 6×6 problems**

**TableA.1. Transportation time between location  $r$  and  $s$  ( $\tilde{t}_{rs}$ ) – (unit of time)**

	Location 0	Location 1	Location 2	Location 3	Location 4	Location 5	location 6
Location 0	0	(2.4,4.3,5.4)	(2.1,4,4,5)	(3,4,4,5)	(2.3,4,5.1)	(1.3,2,4.1)	(2.1,3,5,4.1)
Location 1	(2.4,4.3,5.4)	0	(1.3,2.2,4)	(2.3,4,5.1)	(2,3,4)	(2.4,4.2,5)	(2.3,4,5.1)
Location 2	(2.1,4,4.5)	(1.3,2.2,4)	0	(2,3,4)	(1.3,2,4.1)	(1.5,2,4.3)	(2.4,4,3,5.4)
Location 3	(3,4,4.5)	(2.3,4,5.1)	(2,3,4)	0	(2.1,3,5,4.1)	(2.3,4,5.1)	(2.3,4,5.1)
Location 4	(2.3,4,5.1)	(2,3,4)	(1.3,2,4.1)	(2.1,3,5,4.1)	0	(1.1,2,4)	(2,3,4)
Location 5	(1.3,2,4.1)	(2.4,4.2,5)	(1.5,2,4.3)	(2.3,4,5.1)	(1.1,2,4)	0	(2.3,3,4.1)
Location 6	(2.1,3,5,4.1)	(2.3,4,5.1)	(2.4,4,3,5.4)	(2.3,4,5.1)	(2,3,4)	(2.3,3,4.1)	0

**TableA.2. Set-up time from job  $i$  to  $j$  on machine 1 ( $\tilde{S}_{ij1}$ ) – (unit of time)**

i \ j	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
Job 1	0	(1,2,3.1)	(1.3,2,3.1)	(2,3,3.3)	(1.3,2,3.1)	(2.1,3,4.1)
Job 2	(2,3.1,4.1)	0	(2.2,4.1,5)	(3,4,4.4)	(2.3,4,5.1)	(1.1,2,3.1)
Job 3	(1.4,2.5,3)	(1.3,2,3.1)	0	(2.3,4,5.1)	(2,3,3.5)	(3,4,5.1)
Job 4	(2,3,4)	(2.2,4.1,5)	(2.3,4,5.1)	0	(1,3,4.1)	(2.3,4,5.1)
Job 5	(2,3,3.5)	(3,4,5.1)	(2,4.1,5)	(3,4,5.1)	0	(1.3,2,3.1)
Job 6	(1,3,4.1)	(2,4,5)	(2.3,4,5)	(2,4,5)	(2.3,4,5.5)	0

**TableA.3. Set-up time from job  $i$  to  $j$  on machine 2 ( $\tilde{S}_{ij2}$ ) – (unit of time)**

$i \backslash j$	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
Job 1	0	(1,3,4.1)	(1.3,2,3.1)	(2,2,9,3.3)	(1.3,2,3.1)	(1.1,2,3.3)
Job 2	(2,3,1,4.1)	0	(2,2,4,1,5)	(3,4,5.1)	(2,2,4,4,5)	(1.1,2,3.1)
Job 3	(2,3,3,4.1)	(1.3,2,3)	0	(2,4,5)	(2,3,2,3,5)	(3,4,5.1)
Job 4	(2,4,4,6)	(2,4,1,5)	(2,3,4,5.1)	0	(1,3,4)	(2,3,4,5.1)
Job 5	(2,3,1,3,5)	(3,4,1,5.1)	(2,3,3,4.1)	(3,1,4,5.1)	0	(2,1,3,4.1)
Job 6	(2,3,4.1)	(2,4,1,5)	(2,2,5,3)	(2,2,4,1,5)	(2,4,5)	0

**TableA.4. Set-up time from job  $i$  to  $j$  on machine 3 ( $\tilde{S}_{ij3}$ ) – (unit of time)**

$i \backslash j$	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
Job 1	0	(1,2,3.1)	(1.3,2,5,3.1)	(2,3,3.3)	(1.3,2,3.1)	(2,1,3,4.1)
Job 2	(2,3,1,4.1)	0	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5.1)	(1.1,2,3.1)
Job 3	(1.1,2,2,3.1)	(1.3,2,3.1)	0	(2,3,4,5.1)	(2,3,3,5)	(3,4,5.1)
Job 4	(2,3,4,5.1)	(2,2,4,1,5)	(2,3,4,5.1)	0	(1,3,4.1)	(2,3,4,5.1)
Job 5	(2,3,3,5)	(3,4,5.1)	(2,4,5)	(3,4,5.1)	0	(1,3,2,3.1)
Job 6	(1,3,4.1)	(2,4,5)	(1,2,3)	(2,4,5)	(2,3,4,3,5)	0

**TableA.5. Set-up time from job  $i$  to  $j$  on machine 4 ( $\tilde{S}_{ij4}$ ) – (unit of time)**

$i \backslash j$	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
Job 1	0	(1,2,3.1)	(1.3,2,3.1)	(2,3,3.3)	(1.3,2,3.1)	(2,1,3,4.1)
Job 2	(2,3,1,4.1)	0	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5.1)	(1.1,2,3.1)
Job 3	(1,4,2,5,3)	(1.3,2,3.1)	0	(2,3,4,5.1)	(2,3,3,5)	(3,4,5.1)
Job 4	(2,3,4)	(2,2,4,5.1)	(2,3,4,5.1)	0	(1,3,4.1)	(2,3,4,5.1)
Job 5	(2,3,3,5)	(3,4,5.1)	(2,4,1,5)	(3,4,5.1)	0	(1,3,2,3.1)
Job 6	(1,3,4.1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5,5)	0

**TableA.6. Set-up time from job  $i$  to  $j$  on machine 5 ( $\tilde{S}_{ij5}$ ) – (unit of time)**

$i \backslash j$	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
Job 1	0	(1,3,4.1)	(1.3,2,3.1)	(2,2.9,3.3)	(1.3,2,3.1)	(1.1,2,3.3)
Job 2	(2,3.1,4.1)	0	(2.2,4.1,5)	(3,4,5.1)	(2.2,4,4.5)	(1.1,2,3.1)
Job 3	(2.3,3,4.1)	(1.3,2,3)	0	(2,4,5)	(2,3.2,3.5)	(3,4,5.1)
Job 4	(2,4,4.6)	(2,4,1,5)	(2.3,4,5.1)	0	(1,3,4)	(2.3,4,5.1)
Job 5	(2,3.1,3.5)	(3,4.1,5.1)	(2.3,3,4.1)	(3.1,4,5.1)	0	(2.1,3,4.1)
Job 6	(2,3,4.1)	(2,4,1,5)	(2,2.5,3)	(2.2,4,1,5)	(2,4,5)	0

**TableA.7. Set-up time from job  $i$  to  $j$  on machine 6 ( $\tilde{S}_{ij6}$ ) – (unit of time)**

$i \backslash j$	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
Job 1	0	(1,2,3.1)	(1.3,2,5,3.1)	(2,3,3.3)	(1.3,2,3.1)	(2.1,3,4.1)
Job 2	(2,3.1,4.1)	0	(2.2,4.1,5)	(3,4,4.4)	(2.3,4,5.1)	(1.1,2,3.1)
Job 3	(1.1,2.2,3)	(1.3,2,3.1)	0	(2.3,4,5.1)	(2,3,3.5)	(3,4,5.1)
Job 4	(2.3,4,5.1)	(2.2,4.1,5)	(2.3,4,5.1)	0	(1,3,4.1)	(2.3,4,5.1)
Job 5	(2,3,3.5)	(3,4,5.1)	(2,4,5)	(3,4,5.1)	0	(1.3,2,3.1)
Job 6	(1,3,4.1)	(2,4,5)	(1,2,3)	(2,4,5)	(2.3,4,3,5)	0

**TableA.8. Set-up time of each job on each machine ( $\tilde{S}_{0jk}$ ) – (unit of time)**

$i \backslash k$	Machine 1	Machine 2	Machine 3	Machine 4	Machine 5	Machine 6
Job 1	(1,2,3.1)	(2.2,4.1,5)	(1,2,3)	(2.2,4.1,5)	(1,2.4,3.4)	(2.2,4.1,5)
Job 2	(2,3.1,4.1)	(3,4,5.1)	(2.2,4.1,5)	(3,4,6.1)	(2.3,4,5.1)	(3.1,4,5.1)
Job 3	(1,2,3.1)	(1.3,3.1,4.1)	(1,2,3.1)	(2.2,4,5.1)	(2,3,3.5)	(2.2,4,5.3)
Job 4	(3,4,5.1)	(1.1,2.3,3.1)	(3,4,5.1)	(1,2.1,3.1)	(1,3,4.1)	(2,3.1,4.1)
Job 5	(2.1,4.1,5)	(2.2,4,5.1)	(2.1,4.1,5)	(3,4,5)	(1,2,3.1)	(1,2.2,3.1)
Job 6	(1,3,4.1)	(2.4,4.1,5)	(2.3,4.2,5.4)	(2.1,4.1,5)	(2.3,4,5.1)	(1,2.2,3.6)

**Tables A.9 to A.20: Transportation time and set up time for 10×10 problems**

**TableA.9. Transportation time between location  $r$  and  $s$  ( $\tilde{t}_{rs}$ ) – (unit of time)**

	Location 0	Location 1	Location 2	Location 3	Location 4	Location 5	location 6	Location 7	Location 8	Location 9	location 10
Location 0	0	(2,4,4,3,5,4)	(2,1,4,4,5)	(3,4,4,5)	(2,3,4,5,1)	(1,3,2,4,1)	(2,1,3,5,4,1)	(2,4,4,2,5)	(1,5,2,4,3)	(2,3,4,5,1)	(1,5,2,4,3)
Location 1	(2,4,4,3,5,4)	0	(1,3,2,2,4)	(2,3,4,5,1)	(2,3,4)	(2,4,4,2,5)	(2,3,4,5,1)	(1,3,2,2,4)	(2,1,4,4,5)	(1,3,2,2,4)	(2,3,4,5,1)
Location 2	(2,1,4,4,5)	(1,3,2,2,4)	0	(2,3,4)	(1,3,2,4,1)	(1,5,2,4,3)	(2,4,4,3,5,4)	(2,3,4,5,1)	(1,5,2,4,3)	(2,1,4,4,5)	(1,3,2,2,4)
Location 3	(3,4,4,5)	(2,3,4,5,1)	(2,3,4)	0	(2,1,3,5,4,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4)	(2,4,4,2,5)	(1,5,2,4,3)	(2,3,4,5,1)
Location 4	(2,3,4,5,1)	(2,3,4)	(1,3,2,4,1)	(2,1,3,5,4,1)	0	(1,1,2,4)	(2,3,4)	(2,3,4)	(1,3,2,4,1)	(1,5,2,4,3)	(2,3,4)
Location 5	(1,3,2,4,1)	(2,4,4,2,5)	(1,5,2,4,3)	(2,3,4,5,1)	(1,1,2,4)	0	(2,3,3,4,1)	(1,5,2,4,3)	(2,3,4,5,1)	(2,3,4,5,1)	(1,3,2,4,1)
Location 6	(2,1,3,5,4,1)	(2,3,4,5,1)	(2,4,4,3,5,4)	(2,3,4,5,1)	(2,3,4)	(2,3,3,4,1)	0	(2,3,4,5,1)	(2,1,3,5,4,1)	(2,3,4,5,1)	(2,3,4,5,1)
Location 7	(1,3,2,2,4)	(2,3,4)	(1,3,2,4,1)	(1,5,2,4,3)	(2,1,4,4,5)	(1,3,2,2,4)	(1,1,2,4)	0	(2,1,4,4,5)	(1,3,2,2,4)	(1,3,2,2,4)
Location 8	(2,3,4,5,1)	(2,3,4)	(1,3,2,4,1)	(2,1,3,5,4,1)	(2,3,4,5,1)	(2,3,4)	(1,3,2,4,1)	(1,3,2,4,1)	0	(1,1,2,4)	(2,3,4,5,1)
Location 9	(2,3,4)	(1,3,2,4,1)	(2,1,4,4,5)	(1,3,2,2,4)	(1,3,2,4,1)	(2,3,4)	(1,5,2,4,3)	(1,3,2,4,1)	(2,1,3,5,4,1)	0	(2,3,4)
Location 10	(2,3,4,5,1)	(2,3,4)	(1,3,2,4,1)	(2,1,3,5,4,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4)	(1,3,2,4,1)	(1,5,2,4,3)	0

**TableA.10. Set-up time from job  $i$  to  $j$  on machine 1 ( $\tilde{S}_{ij1}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3,1)	(1,3,2,3,1)	(2,3,3,3)	(1,3,2,3,1)	(2,1,3,4,1)	(2,3,4,5,1)	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)	(1,1,2,3,1)	(1,3,2,3,1)	(1,3,2,3,1)	(2,2,4,1,5)	(2,3,4,5,1)
Job 3	(1,4,2,5,3)	(1,3,2,3,1)	0	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)	(1,4,2,5,3)	(1,3,2,3,1)
Job 4	(2,3,4)	(2,2,4,1,5)	(2,3,4,5,1)	0	(1,3,4,1)	(2,3,4,5,1)	(3,4,5,1)	(3,4,5,1)	(1,3,2,3,1)	(1,3,2,3,1)
Job 5	(2,3,3,5)	(3,4,5,1)	(2,4,1,5)	(3,4,5,1)	0	(1,3,2,3,1)	(2,2,4,1,5)	(2,3,4,5,1)	(2,3,4,5,1)	(2,2,4,1,5)
Job 6	(1,3,4,1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5,5)	0	(1,4,2,5,3)	(1,3,2,3,1)	(2,3,3,5)	(1,3,2,2,4)
Job 7	(2,3,3,5)	(1,3,2,3,1)	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)	(1,3,2,2,4)	0	(2,3,4,5,1)	(2,2,4,1,5)	(1,3,2,3,1)
Job 8	(1,3,2,3,1)	(2,3,4,5,1)	(2,3,4,5,1)	(1,3,2,3,1)	(1,3,2,3,1)	(1,5,2,4,3)	(2,1,4,4,5)	0	(1,3,2,3,1)	(2,2,4,1,5)
Job 9	(2,2,4,1,5)	(2,3,3,5)	(2,3,3,5)	(2,2,4,1,5)	(2,3,4,5,1)	(1,4,2,5,3)	(1,3,2,3,1)	(2,2,4,1,5)	0	(3,4,5,1)
Job 10	(3,4,5,1)	(1,5,2,4,3)	(2,1,4,4,5)	(1,3,2,2,4)	(2,3,3,5)	(2,3,4,5,1)	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)	0

**TableA.11. Set-up time from job  $i$  to  $j$  on machine 2 ( $\tilde{S}_{ij2}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,3,4,1)	(1,3,2,3,1)	(2,2,9,3,3)	(1,3,2,3,1)	(1,1,2,3,3)	(1,5,2,4,3)	(1,3,2,4,1)	(2,3,4)	(1,5,2,4,3)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,5,1)	(2,2,4,4,5)	(1,1,2,3,1)	(1,3,2,3,1)	(1,3,2,3,1)	(2,3,4,5,1)	(2,1,3,4,1)
Job 3	(2,3,3,4,1)	(1,3,2,3)	0	(2,4,5)	(2,3,2,3,5)	(3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)	(3,4,5,1)	(1,1,2,3,1)
Job 4	(2,4,4,6)	(2,4,1,5)	(2,3,4,5,1)	0	(1,3,4)	(2,3,4,5,1)	(1,3,2,2,4)	(1,3,2,2,4)	(2,3,4,5,1)	(3,4,5,1)
Job 5	(2,3,1,3,5)	(3,4,1,5,1)	(2,3,3,4,1)	(3,1,4,5,1)	0	(2,1,3,4,1)	(1,3,2,4,1)	(2,3,4)	(1,5,2,4,3)	(2,3,4,5,1)
Job 6	(2,3,4,1)	(2,4,1,5)	(2,2,5,3)	(2,2,4,1,5)	(2,4,5)	0	(1,3,2,3)	(2,3,3,5)	(2,2,4,1,5)	(2,3,4,1)
Job 7	(2,4,1,5)	(1,3,2,3,1)	(1,3,2,3)	(3,4,5,1)	(2,4,1,5)	(2,1,3,4,1)	0	(3,4,5,1)	(2,2,4,1,5)	(1,3,2,3)
Job 8	(1,3,2,3)	(2,2,4,1,5)	(2,4,1,5)	(2,4,5)	(1,3,2,3,1)	(1,1,2,3,1)	(1,3,2,3)	0	(2,4,1,5)	(2,2,5,3)
Job 9	(2,4,1,5)	(1,3,2,2,4)	(3,4,1,5,1)	(1,3,2,4,1)	(2,2,4,1,5)	(3,4,5,1)	(2,4,1,5)	(3,4,5,1)	0	(3,4,5,1)
Job 10	(3,4,1,5,1)	(2,3,3,5)	(3,4,5,1)	(2,2,4,1,5)	(1,3,2,2,4)	(2,3,4,5,1)	(3,4,1,5,1)	(2,2,5,3)	(2,2,4,1,5)	0

**TableA.12. Set-up time from job  $i$  to  $j$  on machine 3 ( $\tilde{S}_{ij3}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3,1)	(1,3,2,5,3,1)	(2,3,3,3)	(1,3,2,3,1)	(2,1,3,4,1)	(2,3,4,5,1)	(1,3,4,1)	(2,2,4,1,5)	(2,3,4,5,1)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)	(1,1,2,3,1)	(2,4,1,5)	(3,4,5,1)	(2,4,1,5)	(2,1,3,4,1)
Job 3	(1,1,2,2,3,1)	(1,3,2,3,1)	0	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,3,4,5)	(2,3,1,4,1)	(1,1,2,3,1)	(1,3,2,3)
Job 4	(2,3,4,5,1)	(2,2,4,1,5)	(2,3,4,5,1)	0	(1,3,4,1)	(2,3,4,5,1)	(2,2,4,1,5)	(1,1,2,2,3,1)	(2,3,4,5,1)	(2,3,4,5,1)
Job 5	(2,3,3,5)	(3,4,5,1)	(2,4,5)	(3,4,5,1)	0	(1,3,2,3,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)	(1,3,2,3,1)
Job 6	(1,3,4,1)	(2,4,5)	(1,2,3)	(2,4,5)	(2,3,4,3,5)	0	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,3,1,4,1)
Job 7	(2,4,1,5)	(1,3,2,3,1)	(2,3,4,5,1)	(1,3,2,4,1)	(2,3,4,5,1)	(2,1,3,4,1)	0	(2,3,4)	(1,5,2,4,3)	(1,1,2,2,3,1)
Job 8	(2,3,4,5)	(2,2,4,1,5)	(2,4,1,5)	(2,4,5)	(1,3,2,3,1)	(1,1,2,3,1)	(1,3,2,3)	0	(2,2,4,1,5)	(2,3,4,5,1)
Job 9	(2,2,4,1,5)	(1,3,2,2,4)	(2,3,4,5)	(1,3,4,1)	(1,3,2,3)	(3,4,5,1)	(2,4,1,5)	(2,1,3,4,1)	0	(1,5,2,4,3)
Job 10	(2,3,4,5,1)	(2,3,3,5)	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,3,4,5)	(2,1,3,4,1)	(1,3,2,4,1)	(2,3,4)	0

**TableA.13. Set-up time from job  $i$  to  $j$  on machine 4 ( $\tilde{S}_{ij4}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3,1)	(1,3,2,3,1)	(2,3,3,3)	(1,3,2,3,1)	(2,1,3,4,1)	(2,2,4,1,5)	(3,4,5,1)	(2,4,5)	(3,4,5,1)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)	(1,1,2,3,1)	(3,4,5,1)	(2,2,4,1,5)	(1,1,2,2,3,1)	(2,3,4,5,1)
Job 3	(1,4,2,5,3)	(1,3,2,3,1)	0	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,4,5)	(3,4,5,1)	(2,2,4,1,5)	(1,1,2,3,1)
Job 4	(2,3,4)	(2,2,4,5,1)	(2,3,4,5,1)	0	(1,3,4,1)	(2,3,4,5,1)	(1,3,2,3,1)	(2,4,5)	(3,4,5,1)	(3,4,5,1)
Job 5	(2,3,3,5)	(3,4,5,1)	(2,4,1,5)	(3,4,5,1)	0	(1,3,2,3,1)	(2,3,4,5,1)	(1,3,2,4,1)	(2,4,5)	(2,3,4,5,1)
Job 6	(1,3,4,1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5,5)	0	(1,2,3,1)	(2,4,5)	(1,3,2,3,1)	(1,3,2,3,1)
Job 7	(2,2,4,1,5)	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,3,4,5,1)	(2,2,4,1,5)	0	(2,3,4,5,1)	(1,2,3,1)	(1,1,2,2,3,1)
Job 8	(3,4,5,1)	(2,4,5)	(1,3,2,3,1)	(1,1,2,3,1)	(3,4,5,1)	(2,4,5)	(3,4,5,1)	0	(1,3,2,3,1)	(1,1,2,3,1)
Job 9	(2,4,5)	(3,4,5,1)	(3,4,5,1)	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(2,3,4,5,1)	(2,3,3,5)	0	(2,4,5)
Job 10	(1,3,2,3,1)	(2,2,4,1,5)	(1,1,2,2,3,1)	(2,3,4,5,1)	(2,4,5)	(1,3,2,3,1)	(1,1,2,3,1)	(2,3,4,5,1)	(2,3,3,5)	0

**TableA.14. Set-up time from job  $i$  to  $j$  on machine 5 ( $\tilde{S}_{ij5}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,3,4,1)	(1,3,2,3,1)	(2,2,9,3,3)	(1,3,2,3,1)	(1,1,2,3,3)	(3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)	(3,4,5,1)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,5,1)	(2,2,4,4,5)	(1,1,2,3,1)	(3,4,5,1)	(2,3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)
Job 3	(2,3,3,4,1)	(1,3,2,3)	0	(2,4,5)	(2,3,2,3,5)	(3,4,5,1)	(2,3,3,3)	(1,3,2,3,1)	(2,1,3,4,1)	(2,4,5)
Job 4	(2,4,4,6)	(2,4,1,5)	(2,3,4,5,1)	0	(1,3,4)	(2,3,4,5,1)	(2,4,1,5)	(2,2,4,1,5)	(2,2,4,1,5)	(3,4,5,1)
Job 5	(2,3,1,3,5)	(3,4,1,5,1)	(2,3,3,4,1)	(3,1,4,5,1)	0	(2,1,3,4,1)	(3,4,1,5,1)	(2,4,5)	(2,4,1,5)	(1,3,2,3,1)
Job 6	(2,3,4,1)	(2,4,1,5)	(2,2,5,3)	(2,2,4,1,5)	(2,4,5)	0	(2,4,1,5)	(3,4,5,1)	(3,4,1,5,1)	(2,4,5)
Job 7	(2,2,4,1,5)	(2,2,4,1,5)	(2,2,4,1,5)	(2,3,3,3)	(1,3,2,3,1)	(2,1,3,4,1)	0	(1,3,2,3,1)	(2,2,4,1,5)	(3,4,5,1)
Job 8	(2,4,5)	(3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)	(3,4,5,1)	(3,4,5,1)	(2,3,4,5,1)	0	(2,4,5)	(1,3,2,3,1)
Job 9	(3,4,5,1)	(3,4,5,1)	(2,1,3,4,1)	(2,3,4,5,1)	(3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)	(3,4,5,1)	0	(2,3,4,5,1)
Job 10	(1,3,2,3,1)	(1,3,2,3,1)	(2,2,4,1,5)	(3,4,5,1)	(2,2,4,4,5)	(1,1,2,3,1)	(2,3,3,3)	(1,3,2,3,1)	(1,3,2,3,1)	0

**TableA.15. Set-up time from job  $i$  to  $j$  on machine 6 ( $\tilde{S}_{ij6}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3,1)	(1,3,2,5,3,1)	(2,3,3,3)	(1,3,2,3,1)	(2,1,3,4,1)	(2,4,5)	(2,4,5)	(2,2,4,1,5)	(1,3,2,3,1)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,4,4)	(2,3,4,5,1)	(1,1,2,3,1)	(3,4,5,1)	(2,2,4,4,5)	(1,1,2,3,1)	(2,4,5)
Job 3	(1,1,2,2,3)	(1,3,2,3,1)	0	(2,3,4,5,1)	(2,3,3,5)	(3,4,5,1)	(1,3,2,3,1)	(2,2,4,1,5)	(2,3,4,5,1)	(2,3,4,5,1)
Job 4	(2,3,4,5,1)	(2,2,4,1,5)	(2,3,4,5,1)	0	(1,3,4,1)	(2,3,4,5,1)	(2,4,5)	(2,3,4,5,1)	(2,4,5)	(3,4,5,1)
Job 5	(2,3,3,5)	(1,1,2,3,1)	(2,4,5)	(3,4,5,1)	0	(1,3,2,3,1)	(1,2,3)	(2,2,4,1,5)	(2,2,4,1,5)	(2,4,5)
Job 6	(1,3,4,1)	(3,4,5,1)	(1,2,3)	(2,4,5)	(2,3,4,3,5)	0	(2,2,4,1,5)	(2,3,4,5,1)	(2,3,4,5,1)	(3,4,5,1)
Job 7	(2,3,4,5,1)	(1,1,2,3,1)	(2,2,4,1,5)	(1,3,2,3,1)	(2,2,4,1,5)	(2,3,4,5,1)	0	(3,4,5,1)	(3,4,5,1)	(2,3,4,5,1)
Job 8	(3,4,5,1)	(3,4,5,1)	(2,3,4,5,1)	(3,4,5,1)	(2,2,4,1,5)	(2,2,4,1,5)	(2,4,5)	0	(2,2,4,1,5)	(1,3,2,3,1)
Job 9	(2,4,5)	(2,3,4,5,1)	(2,4,5)	(3,4,5,1)	(2,2,4,1,5)	(2,3,4,5,1)	(2,2,5,3)	(2,2,4,1,5)	0	(1,1,2,3,1)
Job 10	(1,3,2,3,1)	(1,3,2,3,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)	(3,4,5,1)	(1,3,2,3,1)	(2,2,4,1,5)	(2,3,4,5,1)	0

**TableA.16. Set-up time from job  $i$  to  $j$  on machine 1 ( $\tilde{S}_{ij7}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3.1)	(1,3,2,3.1)	(2,3,3.3)	(1,3,2,3.1)	(2,1,3,4.1)	(2,3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(2,4,1.5)
Job 2	(2,3,1,4.1)	0	(2,2,4,1.5)	(3,4,4.4)	(2,3,4,5.1)	(1,1,2,3.1)	(2,4,5)	(1,3,2,3.1)	(1,1,2,3.1)	(2,3,4,5.1)
Job 3	(1,4,2,5.3)	(1,3,2,3.1)	0	(2,3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(2,3,4,5.1)	(2,3,4,5)	(2,3,3.3)	(1,3,2,3.1)
Job 4	(2,3,4)	(2,2,4,1.5)	(2,3,4,5.1)	0	(1,3,4.1)	(2,3,4,5.1)	(2,3,4,5.1)	(2,4,1.5)	(2,4,1.5)	(1,3,2,3.1)
Job 5	(2,3,3.5)	(3,4,5.1)	(2,4,1.5)	(3,4,5.1)	0	(1,3,2,3.1)	(3,4,5.1)	(2,3,4,5)	(2,3,4,5)	(3,4,5.1)
Job 6	(1,3,4.1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5.5)	0	(3,4,5.1)	(2,2,4,1.5)	(2,3,3.5)	(3,4,5.1)
Job 7	(2,3,4,5.1)	(2,3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(2,3,4,5.1)	(2,4,1.5)	0	(2,3,4,5.1)	(2,2,4,1.5)	(2,2,4,1.5)
Job 8	(3,4,5.1)	(2,4,5)	(1,3,2,3.1)	(1,1,2,3.1)	(3,4,5.1)	(2,3,4,5)	(2,3,3.3)	0	(2,1,3,4.1)	(2,4,5)
Job 9	(2,3,3.5)	(3,4,5.1)	(3,4,5.1)	(2,3,4,5.1)	(2,3,3.5)	(2,3,3.5)	(2,4,1.5)	(2,2,4,1.5)	0	(3,4,5.1)
Job 10	(2,4,5)	(2,2,4,1.5)	(1,1,2,2,3.1)	(2,3,4,5.1)	(2,4,5)	(1,3,2,3.1)	(3,4,5.1)	(2,2,4,1.5)	(2,2,4,1.5)	0

**TableA.17. Set-up time from job  $i$  to  $j$  on machine 1 ( $\tilde{S}_{ij8}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3.1)	(1,3,2,3.1)	(2,3,3.3)	(1,3,2,3.1)	(2,1,3,4.1)	(2,4,5)	(1,3,4.1)	(2,3,4,5.1)	(2,3,3.5)
Job 2	(2,3,1,4.1)	0	(2,2,4,1.5)	(3,4,4.4)	(2,3,4,5.1)	(1,1,2,3.1)	(3,4,5.1)	(1,3,2,3.1)	(1,1,2,3.1)	(2,4,5)
Job 3	(1,4,2,5.3)	(1,3,2,3.1)	0	(2,3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(1,1,2,3.1)	(2,4,5)	(2,3,4,5)	(2,4,5)
Job 4	(2,3,4)	(2,2,4,1.5)	(2,3,4,5.1)	0	(1,3,4.1)	(2,3,4,5.1)	(2,3,4,5.1)	(2,4,5)	(2,4,5)	(1,1,2,3.1)
Job 5	(2,3,3.5)	(3,4,5.1)	(2,4,1.5)	(3,4,5.1)	0	(1,3,2,3.1)	(1,3,2,3.1)	(2,3,3.3)	(1,3,2,3.1)	(2,1,3,4.1)
Job 6	(1,3,4.1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5.5)	0	(2,3,4,5.1)	(3,4,4.4)	(2,3,4,5.1)	(1,1,2,3.1)
Job 7	(1,3,2,3.1)	(1,1,2,3.1)	(2,3,4,5.1)	(2,3,3.5)	(1,3,2,3.1)	(2,3,3.5)	0	(3,4,5.1)	(1,3,4.1)	(2,3,4,5.1)
Job 8	(2,3,4,5.1)	(3,4,5.1)	(1,3,4.1)	(2,3,4,5.1)	(2,2,4,1.5)	(2,3,4,5.1)	(1,3,4.1)	0	(3,4,4.4)	(2,3,4,5.1)
Job 9	(2,2,4,1.5)	(1,1,2,3.1)	(2,3,4,5.1)	(2,3,4,5.1)	(3,4,5.1)	(2,4,5)	(1,3,2,3.1)	(1,1,2,3.1)	0	(2,2,4,1.5)
Job 10	(1,4,2,5.3)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,4,5)	(1,3,4.1)	(2,4,5)	(2,3,4,5)	(2,4,5)	0

**TableA.18. Set-up time from job  $i$  to  $j$  on machine 1 ( $\tilde{S}_{ij9}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3.1)	(1,3,2,3.1)	(2,3,3.3)	(1,3,2,3.1)	(2,1,3,4.1)	(1,1,2,3.1)	(2,4,5)	(1,2,3.1)	(1,3,2,3.1)
Job 2	(2,3,1,4.1)	0	(2,2,4,1.5)	(3,4,4.4)	(2,3,4,5.1)	(1,1,2,3.1)	(3,4,5.1)	(2,3,4,5.1)	(2,3,3.5)	(2,2,4,1.5)
Job 3	(1,4,2,5.3)	(1,3,2,3.1)	0	(2,3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(2,3,4,5.1)	(2,3,4,5.1)	(1,3,2,3.1)	(1,1,2,3,3.1)
Job 4	(2,3,4)	(2,2,4,1.5)	(2,2,4,1.5)	0	(3,4,4.4)	(2,3,4,5.1)	(1,3,2,3.1)	(3,4,5.1)	(2,2,4,1.5)	(1,1,2,3.1)
Job 5	(2,3,3.5)	(3,4,5.1)	(1,3,2,3.1)	(2,3,4,5.1)	0	(1,3,2,3.1)	(3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(1,3,2,3.1)
Job 6	(3,4,4.4)	(2,3,4,5.1)	(1,1,2,3.1)	(2,4,5)	(1,3,2,3.1)	0	(2,4,5)	(3,1,4,5.1)	(1,2,3.1)	(1,3,2,3.1)
Job 7	(2,3,4,5.1)	(2,3,3.5)	(3,4,5.1)	(2,3,4,5.1)	(3,4,5.1)	(1,1,2,3.1)	0	(1,3,2,3.1)	(2,3,3.5)	(2,4,5)
Job 8	(2,3,3.5)	(1,3,4.1)	(2,3,4,5.1)	(2,3,4,5.1)	(2,4,5)	(3,4,5.1)	(2,3,4,5.1)	0	(2,3,4,5.1)	(2,2,4,1.5)
Job 9	(3,4,5.1)	(1,1,2,3.1)	(1,3,2,3.1)	(3,4,5.1)	(2,3,3.5)	(2,3,4,5.1)	(2,3,4,5.1)	(3,4,5.1)	0	(2,4,5)
Job 10	(2,4,5)	(2,3,4,5.5)	(1,3,2,3.1)	(3,4,5.1)	(1,3,2,3.1)	(1,3,2,3.1)	(3,4,5.1)	(2,4,5)	(1,3,4.1)	0

**TableA.19. Set-up time from job  $i$  to  $j$  on machine 1 ( $\tilde{S}_{ij10}$ ) – (unit of time)**

	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
Job 1	0	(1,2,3,1)	(1,3,2,3,1)	(2,3,3,3)	(2,4,5)	(2,1,3,4,1)	(1,1,2,3,1)	(2,3,4,5,1)	(2,3,3,5)	(1,1,2,3,1)
Job 2	(2,3,1,4,1)	0	(2,2,4,1,5)	(3,4,4,4)	(3,4,5,1)	(1,1,2,3,1)	(3,4,5,1)	(1,3,4,1)	(2,3,4,5,1)	(1,1,2,3,1)
Job 3	(1,4,2,5,3)	(1,3,2,3,1)	0	(2,3,4,5,1)	(2,4,5)	(1,2,3,1)	(2,1,3,4,1)	(2,3,4,5,1)	(2,3,4,5,1)	(1,3,2,3,1)
Job 4	(2,3,4)	(2,2,4,1,5)	(2,3,4,5,1)	0	(1,1,2,3,1)	(2,3,4,5,1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5,1)
Job 5	(2,3,3,5)	(3,4,5,1)	(2,4,1,5)	(3,4,5,1)	0	(1,3,2,3,1)	(3,4,5,1)	(1,2,3,1)	(2,1,3,4,1)	(2,3,3,5)
Job 6	(1,3,4,1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5,5)	0	(2,4,5)	(1,3,4,1)	(2,3,4,5,1)	(3,4,5,1)
Job 7	(1,3,2,3,1)	(1,1,2,3,1)	(2,3,4,5,1)	(2,3,3,5)	(1,1,2,3,1)	(2,4,5)	0	(2,1,3,4,1)	(2,4,5)	(1,3,4,1)
Job 8	(2,3,4,5,1)	(3,4,5,1)	(1,3,4,1)	(2,3,4,5,1)	(3,4,5,1)	(2,3,4,5,1)	(2,3,3,5)	0	(3,4,5,1)	(1,3,2,3,1)
Job 9	(2,3,3,5)	(1,1,2,3,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)	(1,3,2,3,1)	(3,4,5,1)	0	(2,4,5)
Job 10	(1,3,4,1)	(2,4,5)	(2,3,4,5)	(2,4,5)	(1,3,2,3,1)	(3,4,5,1)	(2,2,4,1,5)	(2,3,4,5,1)	(2,3,4,5,1)	0

**TableA.20. Set-up time of each job on each machine ( $\tilde{S}_{0jk}$ ) – (unit of time)**

	Machine 1	Machine 2	Machine 3	Machine 4	Machine 5	Machine 6	Machine 7	Machine 8	Machine 9	Machine 10
Job 1	(1,2,3,1)	(2,2,4,1,5)	(1,2,3)	(2,2,4,1,5)	(1,2,4,3,4)	(2,2,4,1,5)	(3,4,5,1)	(1,2,1,3,1)	(1,3,4,1)	(2,3,3,3)
Job 2	(2,3,1,4,1)	(3,4,5,1)	(2,2,4,1,5)	(3,4,6,1)	(2,3,4,5,1)	(3,1,4,5,1)	(1,2,3,1)	(1,2,1,3,1)	(1,3,4,1)	(2,3,1,4,1)
Job 3	(1,2,3,1)	(1,3,3,1,4,1)	(1,2,3,1)	(2,2,4,5,1)	(2,3,3,5)	(2,2,4,5,3)	(1,2,1,3,1)	(1,3,4,1)	(1,2,3,1)	(1,2,2,3,1)
Job 4	(3,4,5,1)	(1,1,2,3,3,1)	(3,4,5,1)	(1,2,1,3,1)	(1,3,4,1)	(2,3,1,4,1)	(3,4,5)	(1,2,3,1)	(2,3,4,5,1)	(1,2,2,3,6)
Job 5	(2,1,4,1,5)	(2,2,4,5,1)	(2,1,4,1,5)	(3,4,5)	(1,2,3,1)	(1,2,2,3,1)	(2,1,4,1,5)	(2,3,4,5,1)	(3,4,5,1)	(2,2,4,1,5)
Job 6	(1,3,4,1)	(2,4,4,1,5)	(2,3,4,2,5,4)	(2,1,4,1,5)	(2,3,4,5,1)	(1,2,2,3,6)	(2,3,4,5)	(2,4,5)	(1,3,3,1,4,1)	(1,2,3,1)
Job 7	(1,2,1,3,1)	(1,1,2,3,3)	(3,4,5,1)	(3,4,5,1)	(2,2,4,1,5)	(3,4,6,1)	(2,3,4,5,1)	(2,3,3,5)	(2,3,3,5)	(1,1,2,3,1)
Job 8	(3,4,5)	(1,1,2,3,1)	(3,4,5,1)	(3,4,5,1)	(2,4,1,5)	(3,4,5,1)	(1,3,4,1)	(2,3,4,5,1)	(2,3,4,5,1)	(3,4,5,1)
Job 9	(2,1,4,1,5)	(3,4,5,1)	(2,3,3,3)	(2,4,5)	(2,3,4,5)	(2,4,5)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)	(2,3,4,5,1)
Job 10	(1,2,1,3,1)	(2,3,4,5,1)	(2,4,1,5)	(1,1,2,3,1)	(2,3,4,5,1)	(2,3,3,5)	(2,3,4,5)	(2,4,5)	(2,4,5)	(1,3,2,3,1)

**Problem 1 - 6×6:**

Processing machines (fuzzy processing time)						
Job 1	6 (5, 7, 10)	5 (10, 14, 17)	4 (1, 3, 5)	3 (1, 3, 5)	2 (4, 6, 8)	1 (9, 10, 11)
Job 2	5 (6, 7, 8)	1 (9, 13, 17)	3 (8, 12, 13)	6 (2, 3, 4)	4 (10, 13, 16)	2 (2, 3, 4)
Job 3	3 (4, 5, 6)	1 (10, 11, 12)	5 (9, 12, 16)	2 (8, 12, 13)	6 (6, 9, 12)	4 (4, 7, 9)
Job 4	4 (1, 2, 4)	5 (2, 4, 5)	6 (5, 7, 8)	3 (5, 8, 10)	1 (3, 5, 7)	2 (6, 8, 10)
Job 5	4 (9, 11, 15)	1 (4, 6, 9)	5 (1, 2, 3)	6 (10, 11, 15)	2 (4, 7, 8)	3 (10, 11, 12)
Job 6	5 (6, 7, 9)	3 (1, 2, 4)	2 (6, 9, 11)	6 (10, 14, 18)	4 (1, 2, 3)	1 (9, 13, 14)
Fuzzy due-date	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
	(50, 72, 81, 100)	(85, 97, 112, 133)	(132, 158, 198, 231)	(121, 158, 184, 229)	(141, 183, 244, 283)	(125, 148, 197, 261)

**Problem 2- 6×6:**

Processing machines (fuzzy processing time)						
Job 1	4 (9, 13, 17)	3 (6, 9, 12)	1 (10, 11, 13)	5 (5, 8, 11)	2 (10, 14, 17)	6 (9, 11, 15)
Job 2	4 (5, 8, 9)	2 (7, 8, 10)	5 (3, 4, 5)	3 (3, 5, 6)	1 (10, 14, 17)	6 (4, 7, 10)
Job 3	5 (3, 5, 6)	4 (3, 4, 5)	3 (2, 4, 6)	1 (5, 8, 11)	2 (3, 5, 6)	6 (1, 3, 4)
Job 4	6 (8, 11, 14)	3 (5, 8, 10)	1 (9, 13, 17)	4 (8, 12, 13)	2 (10, 12, 13)	5 (3, 5, 7)
Job 5	3 (8, 12, 13)	5 (6, 9, 11)	6 (10, 13, 18)	2 (4, 6, 8)	1 (3, 5, 7)	4 (4, 7, 9)
Job 6	2 (8, 10, 13)	4 (8, 9, 10)	6 (6, 9, 12)	3 (1, 3, 4)	5 (3, 4, 5)	1 (2, 4, 6)
Fuzzy due-date	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
	(50,62,96, 122)	(65, 87, 102, 131)	(72, 88, 109, 134)	(70, 90, 117, 142)	(100, 117, 133, 142)	(124, 135, 184, 229)



**Problem 3- 6×6:**

Processing machines (fuzzy processing time)						
Job 1	1 (6, 7, 9)	6 (1, 2, 4)	4 (4, 7, 8)	5 (1, 2, 3)	3 (9, 10, 13)	2 (2, 3, 5)
Job 2	1 (10, 13, 16)	4 (7, 11, 15)	5 (6, 8, 11)	6 (2, 4, 5)	2 (9, 12, 15)	3 (2, 3, 4)
Job 3	2 (5, 6, 9)	6 (9, 10, 11)	3 (6, 7, 10)	4 (9, 11, 14)	1 (8, 10, 14)	5 (9, 11, 12)
Job 4	6 (10, 11, 15)	4 (3, 4, 6)	1 (9, 12, 16)	2 (9, 12, 15)	5 (4, 5, 7)	3 (5, 7, 9)
Job 5	4 (2, 3, 5)	5 (8, 12, 14)	3 (1, 3, 5)	2 (3, 4, 5)	1 (3, 4, 6)	6 (4, 5, 6)
Job 6	5 (5, 8, 10)	3 (7, 10, 11)	1 (1, 3, 4)	6 (6, 8, 9)	4 (4, 6, 7)	2 (3, 4, 6)
Fuzzy due-date	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6
	(57, 68, 91, 113)	(75, 88, 100, 122)	(93, 124, 132, 149)	(103, 121, 137, 142)	(121, 154, 194, 232)	(175, 265, 314, 335)

**Problem 1 - 10×10:**

Processing machines (fuzzy processing time)										
Job 1	7 (3, 4, 5)	9 (10, 12, 13)	2 (4, 7, 10)	5 (5, 8, 9)	4 (10, 12, 16)	1 (10, 11, 13)	6 (4, 7, 10)	3 (4, 5, 8)	8 (4, 6, 7)	10 (9, 12, 13)
Job 2	10 (10, 11, 14)	3 (9, 12, 14)	5 (7, 10, 14)	4 (7, 11, 12)	8 (2, 4, 6)	1 (8, 10, 14)	2 (7, 11, 12)	7 (8, 11, 14)	6 (6, 9, 10)	9 (10, 14, 15)
Job 3	5 (5, 7, 10)	7 (2, 3, 5)	4 (1, 3, 4)	3 (7, 10, 12)	1 (8, 11, 12)	8 (2, 4, 5)	6 (4, 5, 7)	2 (7, 8, 10)	9 (9, 13, 14)	10 (8, 12, 15)
Job 4	5 (5, 8, 10)	6 (4, 5, 8)	4 (7, 10, 14)	7 (3, 5, 7)	8 (4, 5, 6)	2 (8, 10, 12)	1 (2, 3, 4)	9 (2, 3, 5)	3 (6, 8, 11)	10 (6, 8, 11)
Job 5	2 (4, 7, 10)	7 (5, 6, 7)	4 (9, 10, 14)	1 (2, 3, 4)	3 (9, 12, 13)	5 (5, 6, 9)	9 (5, 7, 8)	6 (1, 2, 4)	8 (3, 4, 6)	10 (2, 4, 6)
Job 6	7 (1, 3, 4)	3 (3, 4, 5)	8 (3, 5, 6)	2 (5, 7, 8)	4 (8, 9, 13)	9 (9, 12, 14)	10 (4, 7, 8)	1 (1, 2, 4)	6 (2, 4, 5)	5 (6, 9, 12)
Job 7	10 (10, 11, 14)	8 (2, 3, 4)	6 (9, 10, 12)	3 (9, 10, 11)	7 (4, 5, 6)	2 (3, 5, 7)	9 (1, 3, 4)	4 (2, 4, 5)	1 (8, 10, 13)	5 (7, 10, 11)
Job 8	6 (7, 11, 15)	2 (9, 13, 15)	8 (5, 6, 9)	4 (8, 9, 13)	7 (6, 9, 12)	3 (6, 8, 10)	9 (6, 9, 11)	5 (1, 2, 4)	10 (8, 12, 14)	1 (6, 9, 12)
Job 9	7 (4, 7, 10)	2 (3, 5, 6)	8 (6, 9, 10)	6 (3, 5, 6)	9 (8, 11, 12)	4 (5, 7, 10)	10 (4, 6, 9)	1 (1, 2, 4)	3 (3, 5, 7)	5 (10, 12, 15)
Job 10	4 (1, 2, 3)	1 (8, 12, 13)	9 (7, 8, 9)	10 (6, 9, 12)	5 (9, 11, 15)	2 (7, 11, 15)	6 (10, 14, 18)	3 (1, 3, 5)	8 (1, 2, 4)	7 (2, 3, 5)
Fuzzy due-date	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
	(105, 138, 197, 254)	(176, 198, 239, 293)	(114, 138, 179, 213)	(116, 138, 191, 224)	(123, 175, 195, 235)	(129, 184, 234, 327)	(77, 89, 97, 123)	(126, 181, 227, 313)	(189, 248, 284, 315)	(158, 228, 231, 244)

**Problem 2 - 10×10:**

Processing machines (fuzzy processing time)										
Job 1	4 (10, 13, 16)	6 (4, 7, 9)	7 (10, 12, 13)	8 (5, 6, 7)	9 (6, 8, 9)	2 (7, 8, 12)	5 (10, 12, 15)	3 (5, 6, 7)	1 (2, 3, 5)	10 (10, 14, 18)
Job 2	2 (3, 5, 6)	1 (9, 10, 13)	3 (5, 8, 9)	10 (9, 12, 16)	6 (5, 6, 9)	7 (7, 11, 12)	5 (9, 13, 14)	9 (8, 12, 16)	8 (2, 4, 6)	4 (4, 7, 10)
Job 3	7 (9, 12, 14)	10 (10, 13, 14)	9 (5, 7, 8)	4 (3, 4, 6)	5 (4, 7, 8)	2 (3, 5, 7)	8 (3, 4, 6)	9 (4, 7, 8)	2 (4, 7, 10)	3 (2, 3, 5)
Job 4	5 (10, 12, 16)	7 (1, 2, 4)	10 (6, 8, 10)	6 (1, 3, 5)	4 (7, 8, 11)	1 (5, 8, 10)	8 (9, 10, 14)	9 (4, 7, 8)	2 (4, 7, 10)	3 (2, 3, 5)
Job 5	5 (9, 12, 15)	6 (8, 11, 14)	10 (10, 14, 17)	1 (5, 7, 9)	2 (2, 4, 5)	4 (1, 3, 5)	7 (7, 8, 10)	9 (3, 4, 6)	8 (9, 11, 13)	3 (1, 2, 3)
Job 6	8 (4, 7, 9)	2 (10, 12, 15)	3 (3, 4, 5)	4 (10, 14, 18)	1 (5, 6, 9)	5 (10, 14, 16)	9 (10, 12, 15)	6 (8, 9, 12)	10 (5, 8, 9)	7 (4, 7, 10)
Job 7	5 (8, 12, 13)	10 (2, 4, 6)	8 (10, 14, 18)	1 (5, 7, 9)	6 (4, 5, 8)	9 (4, 5, 7)	7 (7, 10, 11)	2 (10, 11, 12)	3 (10, 13, 15)	4 (9, 12, 13)
Job 8	2 (10, 12, 15)	6 (5, 6, 9)	3 (1, 2, 4)	8 (6, 9, 12)	4 (4, 6, 9)	1 (7, 11, 14)	9 (7, 11, 13)	5 (6, 9, 11)	10 (8, 11, 13)	7 (7, 9, 13)
Job 9	9 (2, 4, 6)	6 (2, 3, 5)	2 (2, 3, 4)	4 (4, 6, 7)	10 (6, 8, 9)	3 (8, 12, 14)	1 (4, 7, 9)	7 (8, 11, 14)	8 (1, 2, 3)	5 (3, 5, 6)
Job 10	7 (5, 8, 9)	8 (6, 8, 9)	3 (8, 12, 16)	1 (6, 9, 12)	9 (7, 11, 13)	5 (10, 11, 14)	4 (7, 10, 11)	2 (3, 5, 7)	10 (3, 4, 6)	6 (8, 11, 15)
Fuzzy due-date	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
	(115, 158, 203, 241)	(117, 137, 188, 234)	(124, 147, 188, 222)	(166, 201, 238, 244)	(117, 227, 241, 255)	(159, 191, 278, 313)	(107, 159, 197, 223)	(123, 187, 253, 311)	(138, 168, 234, 291)	(126, 177, 197, 235)

**Problem 3 - 10×10:**

Processing machines (fuzzy processing time)										
Job 1	2 (7, 11, 12)	9 (5, 7, 9)	10 (4, 5, 8)	8 (7, 11, 15)	6 (8, 9, 13)	3 (7, 9, 12)	1 (6, 7, 9)	5 (2, 3, 4)	7 (4, 7, 8)	4 (2, 4, 5)
Job 2	6 (3, 5, 6)	1 (1, 2, 3)	5 (1, 2, 4)	8 (10, 11, 14)	2 (8, 12, 14)	4 (2, 4, 5)	7 (5, 8, 10)	10 (8, 9, 11)	3 (2, 4, 5)	9 (4, 6, 8)
Job 3	9 (9, 11, 12)	7 (8, 9, 13)	3 (7, 9, 10)	6 (3, 5, 7)	2 (10, 13, 17)	5 (2, 4, 6)	4 (8, 9, 13)	8 (3, 4, 5)	1 (1, 2, 3)	10 (4, 5, 7)
Job 4	2 (8, 11, 13)	1 (2, 3, 5)	8 (4, 7, 8)	4 (4, 6, 7)	3 (5, 7, 8)	9 (6, 8, 10)	10 (2, 3, 4)	7 (8, 12, 14)	6 (5, 7, 8)	5 (4, 6, 9)
Job 5	3 (4, 6, 7)	9 (4, 7, 9)	7 (6, 9, 12)	10 (2, 4, 5)	4 (1, 3, 5)	6 (9, 10, 12)	5 (10, 11, 12)	1 (5, 7, 9)	2 (8, 10, 13)	8 (4, 6, 9)
Job 6	9 (7, 8, 9)	4 (4, 5, 8)	1 (4, 5, 7)	3 (4, 6, 8)	7 (6, 7, 9)	10 (3, 5, 7)	8 (9, 11, 15)	2 (7, 11, 12)	5 (6, 9, 12)	6 (5, 7, 9)
Job 7	6 (5, 6, 8)	2 (5, 6, 9)	9 (4, 6, 7)	8 (8, 9, 10)	4 (9, 13, 14)	3 (4, 5, 8)	10 (7, 10, 12)	5 (3, 4, 6)	1 (9, 12, 15)	7 (5, 8, 10)
Job 8	6 (7, 11, 14)	4 (3, 5, 6)	3 (10, 13, 14)	10 (7, 9, 11)	8 (7, 10, 13)	1 (5, 8, 10)	9 (7, 11, 13)	5 (10, 12, 16)	7 (10, 14, 16)	2 (6, 7, 10)
Job 9	10 (2, 3, 5)	6 (1, 3, 4)	7 (4, 5, 8)	3 (10, 14, 16)	8 (3, 4, 6)	5 (1, 3, 4)	1 (1, 2, 3)	9 (3, 5, 6)	2 (5, 8, 9)	4 (8, 11, 14)
Job 10	4 (6, 8, 9)	7 (5, 7, 9)	5 (5, 6, 8)	9 (3, 5, 7)	1 (2, 3, 5)	2 (1, 2, 3)	3 (8, 10, 13)	8 (9, 13, 16)	10 (4, 5, 8)	6 (2, 4, 5)
Fuzzy due-date	Job 1	Job 2	Job 3	Job 4	Job 5	Job 6	Job 7	Job 8	Job 9	Job 10
	(127, 237, 261, 285)	(149, 191, 225, 283)	(106, 149, 198, 246)	(116, 148, 191, 226)	(164, 195, 245, 275)	(126, 188, 226, 291)	(127, 177, 198, 246)	(134, 178, 189, 225)	(169, 191, 247, 316)	(155, 224, 242, 286)