Appendix2 Problem and its improved answer for j60 sets in test 1

Appendix Table 2 the improved solutions for J60 sets (15 instances)

|  |  |  |  |
| --- | --- | --- | --- |
| J60 instances number | The optimum value given by PSPLIB | The improved solution obtained from this paper | Use time(second) |
| J602\_6 | 64 | 61 | 1.44s |
| J602\_7 | 53 | 50 | 18.63s |
| J602\_10 | 69 | 65 | 12s |
| J6019\_6 | 69 | 68 | 5.8s |
| J6019\_9 | 69 | 67 | 4.8s |
| J6021\_10 | 80 | 71 | 50s |
| J6033\_3 | 79 | 77 | 11s |
| J6033\_7 | 78 | 76 | 6.4s |
| J6034\_1 | 72 | 69 | 23s |
| J6034\_2 | 68 | 65 | 11s |
| J6035\_3 | 89 | 87 | 7.5s |
| J6035\_9 | 76 | 73 | 2.74s |
| J6037\_2 | 95 | 93 | 63s |
| J6037\_9 | 96 | 94 | 47s |
| J6041\_6 | 134 | 133 | 269s |

j602\_6.sm,

[0, 0, 0, 0, 1, 4, 5, 1, 1, 12, 4, 4, 8, 8, 8, 18, 9, 12, 12, 5, 21, 28, 19, 8, 18, 12, 22, 8, 9, 12, 23, 19, 21, 26, 21, 32, 15, 28, 28, 18, 22, 15, 39, 18, 35, 26, 25, 29, 28, 18, 43, 30, 34, 39, 34, 39, 41, 19, 51, 48, 50, 61] new solution

j602\_7.sm,

[0, 0, 0, 0, 4, 7, 7, 6, 8, 12, 8, 6, 4, 14, 19, 12, 12, 13, 18, 8, 11, 14, 18, 19, 4, 16, 10, 20, 9, 14, 6, 24, 24, 21, 16, 9, 21, 24, 31, 33, 25, 20, 11, 25, 16, 25, 26, 41, 25, 24, 28, 29, 36, 35, 33, 33, 43, 33, 47, 46, 38, 50] new solution

j602\_10.sm,

[0, 0, 0, 0, 8, 13, 10, 8, 10, 28, 13, 10, 17, 20, 18, 20, 17, 23, 29, 20, 20, 34, 23, 39, 33, 18, 18, 30, 31, 42, 28, 41, 28, 24, 22, 17, 35, 40, 28, 32, 44, 23, 34, 41, 39, 27, 33, 26, 42, 36, 37, 49, 47, 57, 40, 40, 52, 51, 60, 62, 57, 65] new solution

j6019\_6.sm,

[0, 0, 0, 0, 4, 13, 13, 2, 13, 4, 16, 6, 6, 22, 22, 23, 32, 12, 27, 23, 28, 35, 22, 30, 41, 39, 27, 41, 40, 40, 12, 4, 16, 8, 28, 10, 40, 28, 35, 10, 41, 41, 36, 35, 46, 44, 46, 45, 49, 53, 45, 46, 56, 42, 56, 59, 60, 63, 44, 64, 62, 68] new solution

j6019\_9.sm,

[0, 0, 0, 0, 9, 5, 14, 1, 11, 14, 11, 18, 5, 19, 13, 19, 19, 14, 15, 19, 25, 14, 23, 26, 30, 15, 39, 30, 24, 25, 9, 31, 49, 30, 35, 53, 31, 23, 34, 42, 39, 31, 24, 28, 36, 36, 46, 37, 46, 55, 50, 40, 53, 62, 41, 42, 52, 42, 63, 62, 58, 67] new solution

j6021\_10.sm,

50.28150463104248s [0, 8, 0, 0, 4, 14, 9, 19, 20, 15, 8, 20, 20, 4, 45, 15, 28, 9, 9, 15, 8, 25, 25, 34, 10, 29, 24, 34, 13, 15, 40, 40, 46, 32, 37, 34, 44, 36, 29, 53, 39, 39, 53, 30, 49, 56, 40, 60, 50, 50, 45, 60, 51, 52, 60, 59, 56, 64, 68, 50, 67, 71] new solution

j6033\_3.sm,

[0, 0, 0, 0, 7, 17, 17, 22, 23, 22, 22, 27, 28, 15, 29, 32, 7, 22, 28, 27, 27, 23, 36, 45, 7, 33, 28, 42, 28, 37, 16, 48, 33, 28, 38, 33, 54, 44, 36, 49, 45, 46, 54, 61, 40, 42, 62, 54, 42, 55, 46, 60, 55, 59, 50, 60, 65, 69, 68, 73, 66, 77] new solution

j6033\_7.sm,

[0, 0, 0, 0, 2, 11, 3, 4, 13, 20, 20, 13, 3, 22, 13, 12, 13, 13, 22, 19, 22, 29, 30, 30, 13, 23, 23, 4, 41, 26, 33, 30, 30, 35, 42, 31, 35, 22, 39, 31, 42, 34, 34, 20, 42, 35, 47, 41, 54, 42, 50, 58, 34, 66, 48, 56, 58, 56, 66, 62, 71, 76] new solution

j6034\_1.sm,

[0, 0, 0, 0, 7, 8, 8, 9, 9, 9, 19, 9, 9, 15, 9, 17, 8, 18, 27, 16, 14, 17, 24, 14, 27, 25, 33, 18, 25, 35, 16, 22, 19, 32, 18, 36, 35, 32, 42, 26, 42, 46, 24, 42, 37, 47, 42, 47, 43, 39, 53, 47, 52, 48, 46, 56, 41, 52, 59, 62, 59, 69]

j6034\_2.sm,

[0, 0, 0, 0, 7, 5, 23, 5, 17, 8, 19, 21, 17, 8, 8, 5, 19, 8, 18, 14, 16, 7, 29, 23, 8, 24, 13, 25, 32, 11, 29, 27, 25, 23, 32, 19, 32, 28, 27, 39, 39, 42, 46, 37, 35, 43, 34, 46, 52, 43, 40, 33, 48, 47, 30, 44, 52, 58, 61, 49, 57, 65]

j6035\_3.sm,

[0, 0, 0, 0, 7, 1, 10, 19, 1, 29, 10, 19, 19, 26, 23, 26, 29, 17, 35, 44, 29, 20, 44, 37, 7, 28, 29, 37, 45, 39, 29, 31, 38, 46, 56, 50, 10, 56, 56, 39, 39, 59, 29, 57, 63, 57, 42, 61, 60, 50, 52, 68, 61, 61, 67, 63, 39, 73, 71, 79, 77, 87]

j6035\_9.sm,

[0, 0, 0, 0, 1, 8, 8, 12, 13, 1, 8, 5, 14, 20, 5, 7, 21, 9, 9, 20, 7, 13, 23, 23, 23, 23, 22, 21, 33, 17, 16, 23, 41, 33, 28, 42, 28, 41, 41, 28, 42, 31, 32, 38, 42, 47, 38, 49, 50, 55, 12, 50, 52, 55, 58, 51, 55, 61, 58, 71, 65, 73]

j6037\_2.sm,95

[0, 0, 0, 0, 7, 8, 17, 16, 12, 16, 28, 32, 22, 27, 32, 8, 32, 21, 22, 32, 12, 34, 37, 37, 44, 37, 32, 22, 35, 17, 37, 46, 58, 31, 68, 21, 25, 42, 46, 46, 52, 58, 41, 43, 58, 62, 52, 69, 68, 70, 69, 68, 77, 77, 72, 72, 83, 75, 85, 83, 79, 93]

j6037\_9.sm,

[0, 0, 0, 0, 15, 27, 6, 2, 34, 34, 8, 19, 37, 19, 27, 55, 15, 37, 15, 23, 8, 28, 8, 72, 23, 12, 61, 36, 28, 66, 42, 27, 74, 49, 64, 55, 78, 49, 55, 71, 40, 61, 78, 59, 55, 66, 53, 73, 66, 65, 75, 72, 80, 76, 73, 81, 83, 81, 87, 92, 90, 94]

j6041\_6.sm,

[0, 0, 0, 38, 4, 10, 16, 10, 17, 19, 19, 19, 22, 19, 56, 4, 36, 39, 28, 48, 51, 23, 29, 45, 39, 50, 76, 66, 50, 61, 74, 66, 31, 107, 69, 83, 74, 77, 87, 87, 75, 88, 48, 87, 62, 90, 91, 73, 91, 89, 99, 101, 101, 108, 107, 99, 112, 122, 122, 113, 132, 133]