LIST OF SYMBOLS

A  Optimal sequence
B_1, B_2, \ldots, B_k  Machine order matrices
C  Gantt chart
c  Cost function (objective function)
c(i)  Cost (objective value/makespan value) of the solution i
C_{\text{max}}  Makespan value of a schedule
C_{\text{max}}^*  Optimal makespan value of an optimal schedule
C^{(1)}, C^{(2)}, \ldots, C^{(q)}  Makespan values
C_i, C_{i2}, \ldots, C_{im}  Cyclic associates of the machine order matrix R_i
C_{\text{max}}^i  Makespan value of the job shop scheduling problem (P, R_i)
C_{\text{max}}^{ij}  Makespan value of the job shop scheduling problem (P, C_{ij})
D(A)  Sequence graph associated with the sequence A
D(L)  Sequence graph associated with the Latin rectangle L
D_{\text{JOM}}  Directed graph with respect to job order matrix
D_{\text{MOM}}  Directed graph with respect to machine order matrix
D_S  Sequence Graph (Directed graph associated with the schedule S)
E_{\text{JOM}}  Edge set with respect to job order matrix
E_{\text{MOM}}  Edge set with respect to machine order matrix
F  The set of feasible solutions
(i, j)  Operation of the job J, to be processed on the machine M_j
J_1, J_2, \ldots, J_n  Job names
M_1, M_2, \ldots, M_m  Machine names
m \quad \text{Number of machines}

n \quad \text{Number of jobs}

n \times m \quad \text{n jobs, m machines job scheduling problem}

N_{h_1}, N_{h_2}, \ldots, N_{h_5} \quad \text{Neighborhood functions}

N_h(x) \quad \text{Neighbor of the solution x}

P \quad \text{Processing time matrix}

\mathbb{R} \quad \text{The set of real numbers}

R \quad \text{Machine order matrix}

R_1, R_2, \ldots, R_k \quad \text{Base machine order matrices}

R_C \quad \text{Cyclic associates of the machine order matrix } R

R^{(k)} \quad \text{k th cyclic assignment of the machine order matrix } R

(P, R) \quad \text{JSSP with PTM } P \text{ and MOM } R

S \quad \text{Optimal schedule}

u, v \quad \text{Operations}

p(u) \quad \text{Processing time of the operation } u

s(u) \quad \text{Start time of the operation } u

V \quad \text{Vertex set}

x, y \quad \text{Solutions}

| OPT | \quad \text{Number of alternative optimal solutions identified by the proposed algorithm.}

| OPT_{RM} | \quad \text{Number of RMOSs identified by our algorithm.}

O(m!) \quad \text{Time complexity of an algorithm}

r_{\text{max}}(A) \quad \text{Make-length of the sequence } A
$UB^O$ Makespan of the best schedule obtained by Brucker’s Branch-and-Bound Algorithm for the Open-Shop Problem.

$UB^I$ Makespan of the best (alternative) schedule obtained by the proposed algorithm, using job shop scheduling approach.

* Solution proved to be optimal.

∧ Problem identified as “hard”.

† The associated optimal schedule is proved to be RMOS.