Pseudocode for the TCSP. Serial Schedule Generation Scheme (with single pass approach, i.e., using only one priority rule) with Priority Rules and Biassed Randomization Sampling.

1. Let E1 be the set of all activities without predecessor;
2. FOR 1 TO n (n is the total number of activities/tasks) DO
3. Choose and activity from the set. This is done by using a Priority Rule. The Priority Rule assigns a weight to each activity of the set. This is done in order to carry out the Biassed Randomization Sampling, i.e. the more the weight (or the less, for some particular Priority Rules), the more is the probability for the activity to be chosen to be scheduled.
4. WHILE the needed amount of resources to do the activity are available (Mechanical or Structural workers, A or B areas capacity) and the restrictions, accomplished (the non-parallel and time-lag=0 restrictions), for some time, DO
5. Calculate smallest time in which the activity can be scheduled.
6. ENDWHILE
7. Schedule the activity in the proper interval (according to the duration of the activity…)
8. Update the current resource profiles by diminishing the resources used for the activity in the interval in which the activity has just been scheduled.
9. Add to the next set of activities all successors (for which all predecessors are scheduled) of the activity which has just been scheduled. Remove the activity that has just been scheduled and put it in the solution.
10. ENDFOR

The best Priority Rules for the problem in my opinion are:

GRPW Greatest Rank Positional Weight: this rule selects activities by summing up the duration of the activity and the duration of all its successors.

MTS Most Total Successors: it counts all the successors the activity has.

Cooper (1976) positioned these priority rules between the first positions of a ranking (of the best priority rules) he did with the results of a study about the sampling applications of the serial method. He employed a sample size of 100. Information extracted from Rainer Kolisch’s “Serial and parallel resource-constrained project scheduling methods revisited: Theory and computation” 1996

The paper by Davies & Patterson (1975) is a computational study on RCPS heuristics. The authors compared heuristic and optimal solutions for RCPS problems. Global results of 25 algorithms on 144 projects (with sample sizes of 27, 51 and 103 activities) showed that GRPW average distance to optimum was 3.30% and MTS average distance to optimum was 3.55%. GRPW was the best priority rule in this aspect and MTS, the third. Information extracted from Slowinski’s “Advances in project scheduling” 1989.

There are another rules that could be good too. For instance, CUMRED CUMulative Resource Equivalent Duration, but its implementation seems difficult. However, I may try it.