Task 23: S/T-System

Given the S/T-System $Y = (S, T, F, K, W, M_0)$ with

- $S = \{s_1, s_2, s_3, s_4, s_5, s_6\}$
- $T = \{t_1, t_2, t_3, t_4, t_5, t_6\}$
- $F = \{(t_1, s_1), (s_1, t_2), (t_2, s_2), (s_2, t_1), (t_2, s_3), (t_2, s_4), (s_3, t_3), (s_4, t_4), (t_3, s_5), (t_4, s_5), (s_5, t_5), (s_5, t_6), (t_5, s_6), (t_6, s_6), (s_6, t_1)\}$
- $K = \{\infty, \infty, \infty, \infty, \infty, \infty\}$
- $W = \{1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 1, 1, 1\}$
- $M_0 = \{1, 0, 0, 0, 0\}$

(a) Draw the netgraph for the above example.

(b) Create the reachability table.

(c) Give the reachability graph.

(d) Consider the subnet $N' = (S', T', F')$ with

- $S' = \{s_3, s_4, s_5, s_6\}$
- $T' = \{t_3, t_4, t_5, t_6\}$
- $F' = \{(s_3, t_3), (s_3, t_4), (t_3, s_5), (t_4, s_5), (s_5, t_5), (s_5, t_6), (t_5, s_6), (t_6, s_6)\}$

(i) Is $N'$ transition-bordered, place-bordered, or neither? Give reasons.

(ii) Draw the simplified netgraph for $Y$, in which $N'$ is substituted with a single place or a single transition.

$4 + 5 + 5 + 6 = 20$ Points
Task 24: Traffic signal system as S/T-System

The following petri net models the behaviour of a traffic signal system, which consists of a traffic light for vehicles and one for pedestrians. The places green, yellow, red and red-yellow represent the states of the vehicle signal and red-F and green-F the states of the pedestrian signal.

(a) Is this a simple graph ("schlicht")? Give reasons.

(b) Are there nooses in this graph (i.e. loops between a single place and a single transition, without any intermediate nodes)? If yes, where? If no, why not?

(c) What can be the elements of the corresponding S/T-System $Y = (S, T, F, K, W, M_0)$?

(d) Create the reachability table for $Y$.

(e) Unfortunately, the above modelled traffic signal does not function properly. Which unwanted situations may occur?

(f) Change the netgraph so that it models the traffic signal system correctly (draw).

\[ 2 + 2 + 4 + 5 + 3 + 4 = 20 \] Points