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# OPERATING SYSTEMS

## EXCERCISES

**EX. 1.** Select all correct answers. The process snapshot includes:

a) data values stored in the processor registers,
b) instruction pointer,
c) data,
d) program instructions set (source code).

**EX. 2.** Select all correct answers. Transitions that are possible between process states are:

a) from processing to ready state,
b) from ready to processing state,
c) from blocked to processing state,
d) from ready to blocked state.

**EX. 3.** Explain problems that are connected with using following methods:

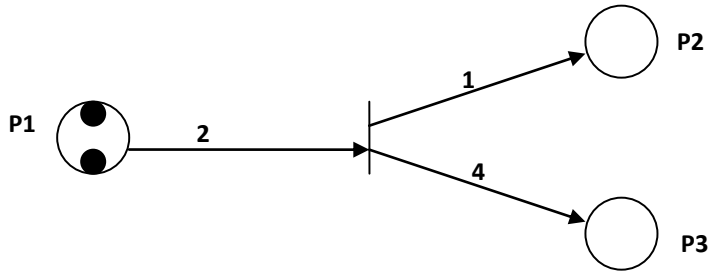
a) strict interchange method – ……
b) TSL instruction (Test Set Locked) – ……

**EX. 4.(*)** Implement **up** procedure of the general semaphore.

**EX. 5.** Select all correct answers. The Petri net can be build from:

a) places,
b) transitions,
c) packages,
d) tokens,
e) arcs (input and output).

**EX. 6.** Select all correct answers taking into consideration the Petri net example presented below.




After firing the transition:

a) P2 place will store exactly one token
b) P2 place will store exactly two tokens
c) P2 place will store exactly four tokens
d) P3 place will store exactly one token
e) P3 place will store exactly three tokens
f) P3 place will store exactly four tokens

(*) asterisk marks problems which are not solved during exercise classes and should be solved as a homework

**EX. 7.** Model the simultaneous transitions execution (AND) using Petri nets methodology. It means that at least two transitions are available at the same time, they are ready to execute and finally can be executed simultaneous (in parallel way).

**EX. 8.** Model the processes conflict (OR) using Petri nets methodology. It means that two input states and one semaphore exist (there are three input places) and two transitions ready to fire are available. After the execution of the first transition the second transition cannot be executed.

**EX. 9.** Model the processes mutual exclusion (confusion) using Petri nets methodology. We have two input states and three transitions. Finally every transition is connected with new, exactly one output state. All transitions are ready to execute in the same moment but after selected transition execution other two transitions are not ready to execute anymore.

**EX. 10.** Model the readers and writer problem using Petri nets methodology. Readers and writer can come in/out to the reading room. Many readers can be in the room at the same time but only one writer can be in the room at the same. It means that when the writer is in the room then no reader can be there.

**EX. 11.** Model the producer-consumer problem using Petri nets methodology assuming that the capacity of the warehouse could be equal to following values:

a) 1
b) n **(*)**
c) 3 **(*)**
d) n and let's assume that the consumer can get one element from the warehouse when the number of products stored in the warehouse is greater or equal three **(*)**
e) n and let's assume that the producer generates and puts into the warehouse four products at the same time after getting by the consumer of three products separately **(*)**

**EX. 12.(*)** Model the philosophers problem using Petri nets methodology. We have five philosophers who are sitting around the table and eating spaghetti (when they are hungry) or thinking (after meal). Two philosophers who are sitting in the direct neighborhood are using the same fork in the mutual exclusion way – it means that only one of them can eat at the same time using particular fork.

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