UNIVERSITY
OF SKÖVDE

School of Informatics (IIT)

WRITTEN EXAMINATION

Course **Business Process Management**

Sub-course

Course code **IT378G** Credits for written examination **4.5**

Date **2025-03-07** Examination time **8:15-12:30**

Examination responsible **Manfred Jeusfeld, Kristens Gudfinnsson**

Teachers concerned **Manfred Jeusfeld, Kristens Gudfinnsson**

Aid at the exam/appendices

Students are allowed to bring a Swedish-English dictionary to the exam

Instructions

- ☒ Take a new sheet of paper for each exam part.
- ☐ Take a new sheet of paper when starting a new question.
- ☒ Write only on one side of the paper.
- ☒ Write your name and personal ID No. on all pages you hand in.
- ☒ Use page numbering.
- ☒ Don´t use a red pen.
- ☒ Mark answered questions with a cross on the cover sheet.

Grade points: 100

Answer in Swedish or English.

Answer all the questions

Examination results should be made public within 18 working days

Good luck!

Total number of pages: 6 (incl. this title page)

The maximum number of points is 100. The grade is calculated from the sum of points achieved for the questions. You need 50 points or more to pass the exam.

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Question 1 (20 points)

Petri nets allow to model business processes and their execution.

- (10 points) Explain the following terms
  - *Start state*
  - *End state*
  - *Workflow net (WFnet)*
  - *Deadlock*
  - *Enabled transition*

- (10 points) Provide a WFnet with at least 12 **transitions** that has a **loop** and at least 3 decision elements that runs into a **deadlock** (i.e., it is not sound)

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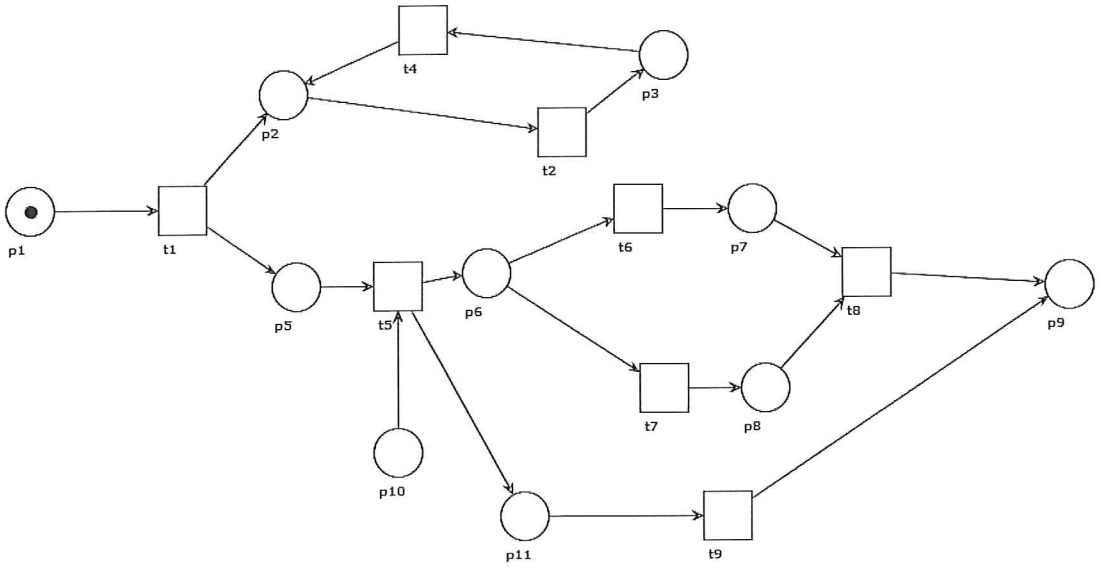
Question 2 (15 points)

Consider the following un-sound petri net



a) (9 points) Identify and describe the flaws in the above petri net that prevent it to be a sound WF-net!

b) (6 points) Define the following terms

- sound WF-net
- boundedness
- liveliness

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Question 3 (20 points)

BPMN defines elements such has parallel gateways XOR gateways, swimlanes, pools, sequence flows, message flows, intermediate catching events, and event-based gateways.

a) (10 points) Precisely define each of the above 8 concepts in 3-4 sentences.

b) (10 points) Give an example of a correct BPMN model that has all 8 elements. Note that you may also need tasks, start and end elements.

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Question 4 (15 points)

Process mining analyzes so-called event logs.

(a) (5 points) What is an event log? Which fields are *mandatory* in an event log?
(b) (5 points) What is a so-called process map?
(c) (5 points) Give an example of an event log with 5 different activities for the same case. Construct a process map for your example event log.

Each answer should be about 1/3 page long. Use your own examples where appropriate!

Question 5 (15 points)

(a) (5 points) In waiting queue theory, we demand that a process must be *stable*. What is meant by a "stable" process.

(b) (5 points) Explain what is understood by "Little's Law" in waiting queue theory? What is the formula for Little's Law?

(c) (5 points) Why can resource utilization not be optimized independently from the cycle time? Explain!

Each answer should be about 1/3 page long. Use your own examples where appropriate!

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Question 6 (15 points)

Provide characteristic curves for the so-called density function of the following distributions:

- exponential distribution
- gamma distribution
- uniform distribution
- triangular distribution
- normal distribution

By which parameters are these distributions specified?

Give arguments when to use which distribution for *interarrival times* and *task times*.