02291 - System Integration - Exam 2023 Sample Exam, Form: A

Name: _____

Student Number: _____

TA: _____

Date: _____

This exam has a maximum duration of 4:00 hours. You are allowed to consult printed material, but you are not allowed to access online material. The exam is individual and collaboration with other persons is strictly forbidden.

To answer a question, write the letter corresponding to the answer in the answer table below, as shown in the example for Question 0. Only answers in the answer table will be considered. Please write **only** one letter per answer. Multiple letters will automatically invalidate the answer.
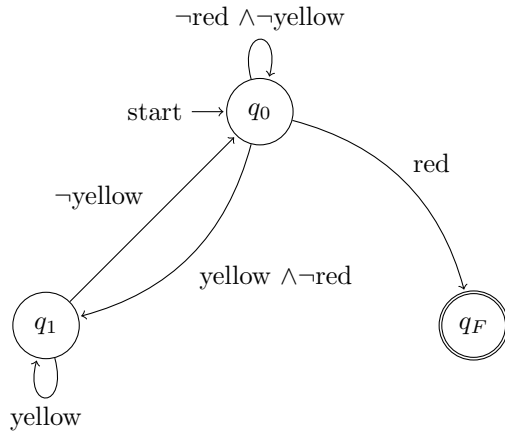
When answering, mark the response with a ✓ in the following table. Only marked answers in the table will be considered. Use a pen/marker or any permanent mark to denote your final answer. Please mark **only** one choice per answer. Multiple answers will automatically invalidate the answer to the question.

Question Nr.	Answer			
	A	B	C	D
0	✓			
1	✓			
2			✓	
3	✓			
4	✓			
5	✓			
6	✓			
7				✓
8				
9				
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11				
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13				
14	✓			
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21				
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26				
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30				

Section 1. Formal Languages

Please select the option that best fits the question.

1. Consider the following automata with alphabet {yellow, green, red}

Select the description that *best* fit the behaviour of the automata:

  (a) Eventually red

  (b) Yellow release red

  (c) Green until red

  (d) Yellow until red

2. Consider the following deterministic finite state automaton (DFA), M, over the alphabet $\{0, 1\}$ defined formally as $M = \{Q, \{0, 1\}, \delta, q_0, F\}$, where:

$$Q = \{q_0, q_1, q_2\} \text{ is the set of states,}$$
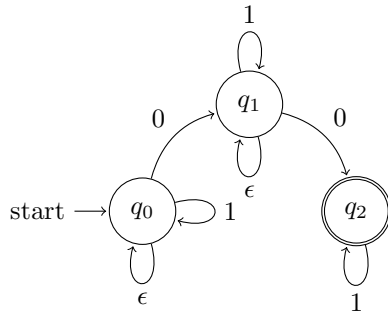$$q_0 \text{ is the initial state,}$$
$$F = \{q_2\} \text{ is the set of final states, and}$$

$$\delta(q, a) = \begin{cases} q_1 & \text{if } q = q_0 \text{ and } a = 0 \\ q_2 & \text{if } q = q_1 \text{ and } a = 1 \\ q_1 & \text{if } q = q_2 \text{ and } a = 0 \\ q_2 & \text{if } q = q_2 \text{ and } a = 1 \\ q_2 & \text{if } q = q_1 \text{ and } a = 0 \\ q_1 & \text{if } q = q_0 \text{ and } a = 1 \end{cases}$$

Which of the following strings will M accept?

  (a) 101010

  (b) 011010

  (c) 100101

  (d) 001000

3. Consider the following nondeterministic finite state automaton (NFA), N, which includes epsilon moves, over the alphabet $\{0, 1\}$ defined formally as $N = \{Q, \{0, 1\}, \delta, q_0, F\}$, with transition relations represented below:
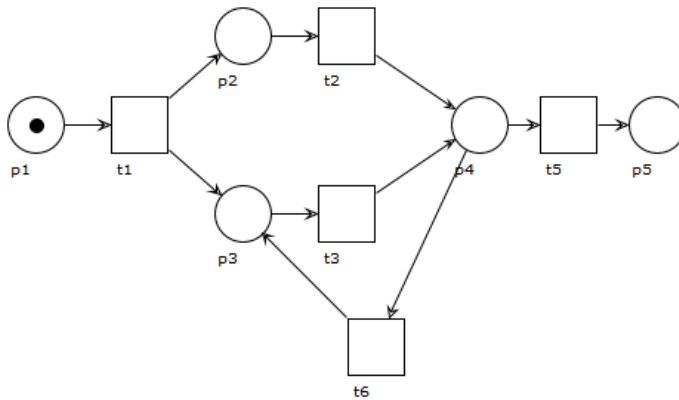

Which of the following strings will N accept?

    (a)   0110

    (b)   1011

    (c)   0010

    (d)   0

Section 2. Workflow Models

Please select the best answer fitting the question.
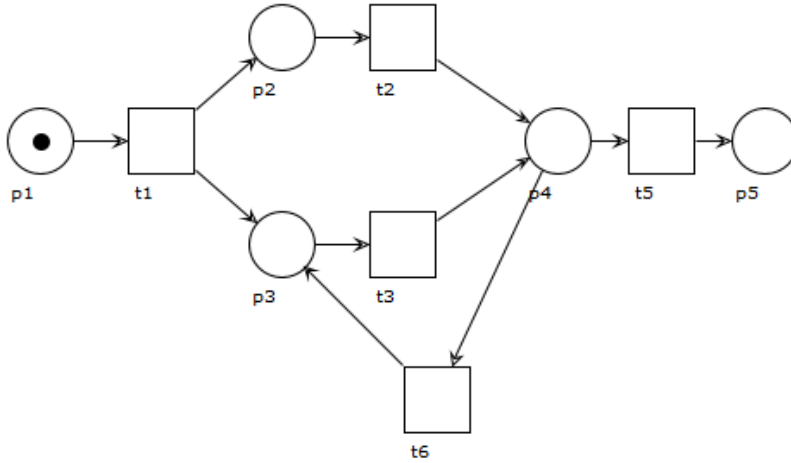
4. Consider the Petri Net:

Which of the reachability graphs shown in section 1 of the appendix is correct that Petri Net?

    (a)   Figure 1A

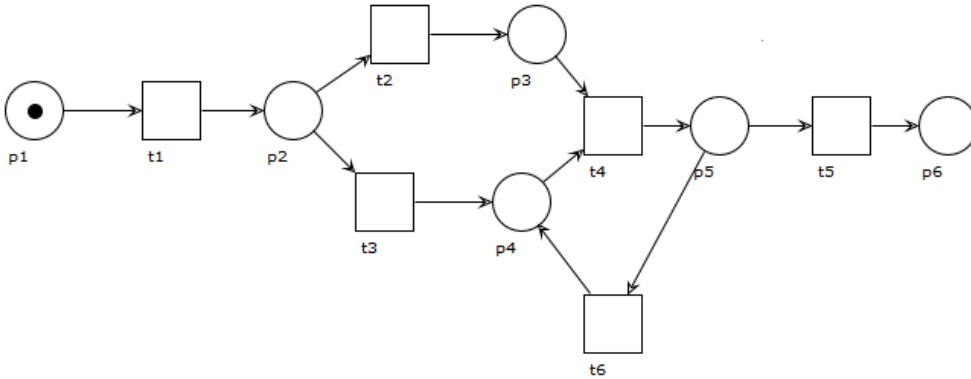   (b)   Figure 1B

    (c)   Figure 1C

    (d)   Figure 1D

5. Consider the Petri Net shown below

Which of the following options correspond to its formalization?

(a)   P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(t2,p4),
       (t3,p4),(p4,t5),(t5,p5),(p4,t6),(t6,p3)}.

(b)   P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t4,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(t2,p4),
       (t3,p4),(p4,t5),(t5,p5),(p4,t6),(t6,p3)}.

(c)   P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(p3,t6),
       (t2,p4),(t3,p4),(p4,t5),(t5,p5),(t6,p4)}

(d)   P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(t2,p4),
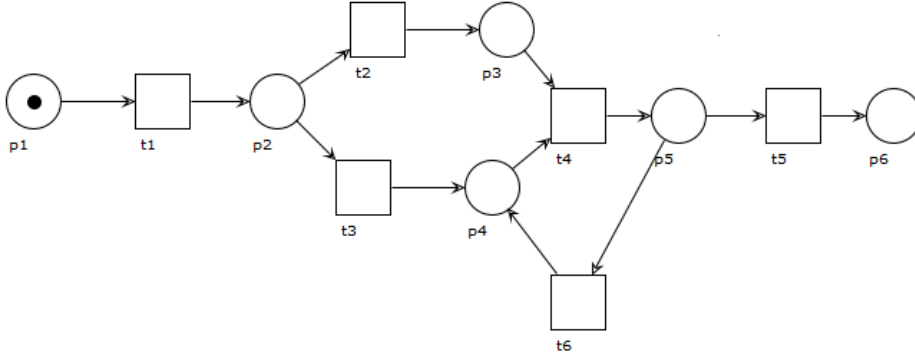   (t3,p4),(p4,t5),(t5,p5),(p4,t6),(t6,p4)}

6. Consider the Petri Net:

Which of the following options is a reachable marking for it?

(a)   p2
(b)   2p5
(c)   p3+p4
(d)   p6

7. Consider the following Petri Net:

Which of the following sentences does NOT hold?

(a)   The Petri Net is deadlock-free.

(b)   Transition t6 is dead.

(c)   Transitions t2 and t3 cannot appear in the same firing sequence.

(d)   The Petri Net is 1-bounded.

Section 3.   Models for Communicating and Distributed Systems

Please select the answer that best fits the question.

8. Consider the following CCS process expression:

$$P = a.\bar{b}.P + c.P' + 0$$

Where $P' = d.P + e.P$

Assume $\to^*$ the transitive closure of $\to$, that is, the sequence of applications of the transition rules in the operational semantics of CCS. Which of the following processes is capable of producing $P \mid Q \to^* 0$ including synchronization actions in $\to^*$?

(a) $Q = (\bar{a}.b.0 \mid \bar{c}.\bar{d}.0).0$

(b) $Q = (\nu a)(\nu b)(\bar{a}.b.Q + \bar{c}.\bar{d}.0)$

(c) $Q = \bar{a}.Q \mid b.Q \mid \bar{c}.Q \mid \bar{d}.0$

(d) $Q = \bar{a}.b.Q + \bar{c}.\bar{d}.0$

9. Consider the following CCS process expression:

$$P = a.\bar{b}.P + c.P' + 0$$

Where $P' = d.P + e.P$

Which of the following statements best describes the behavior of process P?

(a)   Process P represents a recursive behavior where upon receiving an a action, it sends a b action and then continues to behave similarly. It also has a choice between continuing as process P' with either a d or an e action, or terminating.

(b)   Process P can perform an a action followed by a b action, and then it must engage in process P' with either a d or an e action, repeating indefinitely.

(c)   Process P chooses between performing an a action followed by a b action, or engaging in process P' with c and either a d or an e action, but it can eventually terminate.

(d)   Process P starts with a choice between an a action followed by a b action and continuing as process P' with either a d or an e action. It then continues recursively without termination.

10. Consider the CCS process

$$P = (\nu\ payment)(\nu\ burger)(\nu\ pizza)(Disp \mid Susan),$$

where $Disp = payment.(\overline{burger}.Disp + \overline{pizza}.Disp)$, and $Susan = \overline{work}.\overline{payment}.burger.Susan$
Select the statements that are true:

(a) P is a possibly locked process

(b)   The restrictions for $payment, burger$ and $pizza$ are unnecessary in the presence of additional processes

(c) P has a possible deadlock

(d)   None of the above

Section 4. Imperative Process Models
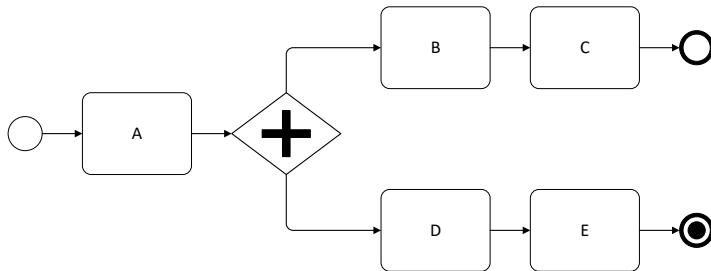
Please select the option that best fits the question.

11. Consider the following process description:

> The fraud detection process of BankDK is structured as follows. If withdrawals made with a customer's credit card at ATMs exceed 15000 DKK, BankDK sends an SMS alert to the customer's mobile phone. If the customer replies to that alert with a message containing the text FRAUD, BankDK blocks the customer's credit card. If no message is received after 3 days since the SMS was sent, the process ends.

Which of the BPMN collaboration diagrams shown in Section 2 of the appendix does NOT correctly capture that process description?

(a)   Figure 2A

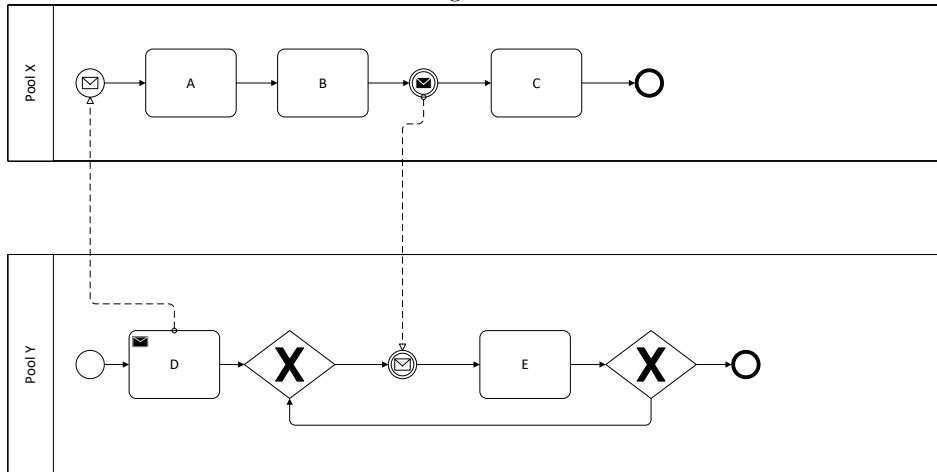(b)   Figure 2B

(c)   Figure 2C

(d)   Figure 2D

12. Consider the BPMN process diagram below:

Which of the following sentences holds true for the model?

(a)   The process can possibly end immediately after executing task B.

(b)   The process can possibly end immediately after executing task D.

(c)   The process can possibly end immediately after executing task A.

(d)   Task B and task D are mutually exclusive.

13. Consider the BPMN collaboration diagram below:

Which of the following sentences holds true for that model?

(a)   There is a deadlock in the process belonging to PoolY.

(b)   There is a deadlock in the process belonging to PoolX.

(c)   Both processes are deadlock-free.

(d)   Task E can always be executed more than once.

14. Consider the following sentence:

> AlText is a publisher of printed academic textbooks and scientific journals. When the paper rolls that AlText has in stock fall below 500 rolls, a request for a quote for 2000 rolls is prepared and sent to one of its supplier. The supplier, upon reception of the request, verifies if it has enough paper rolls in its warehouses. If the supplier does not have enough rolls, it terminates its process by informing AlText. AlText then sends the request for a quote again to another supplier. If a supplier has enough rolls available, it prepares a quote, which is sent to AlText. If, after assessing the quote, AlText is satisfied with it, AlText notifies the supplier that the quote has been accepted, the supplier registers the order, and the process ends on both sides. If AlText is not satisfied with the quote, it sends the request for a quote again to another supplier. If a supplier does not receive the notification within 10 days since the quote was sent, it ends the process.

Which of the BPMN collaboration diagrams shown in Section 3 of the appendix correctly captures that process description.
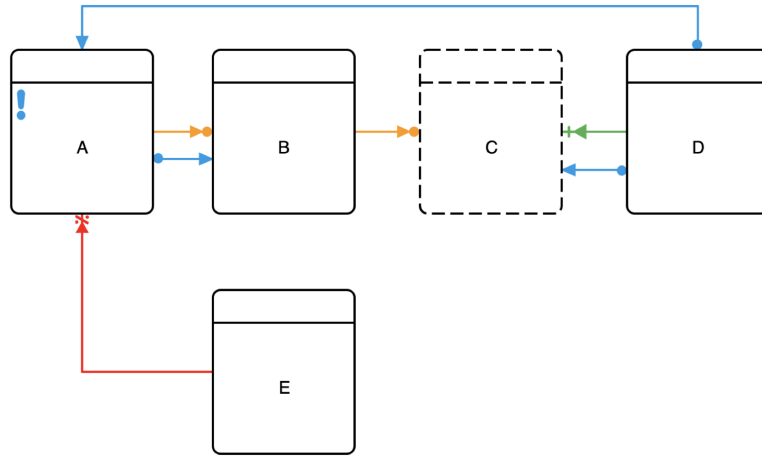
  (a)   Figure 3A
  (b)   Figure 3B
  (c)   Figure 3C
  (d)   Figure 3D

Section 5. Declarative Process Models

Please select the option that best fits the question.
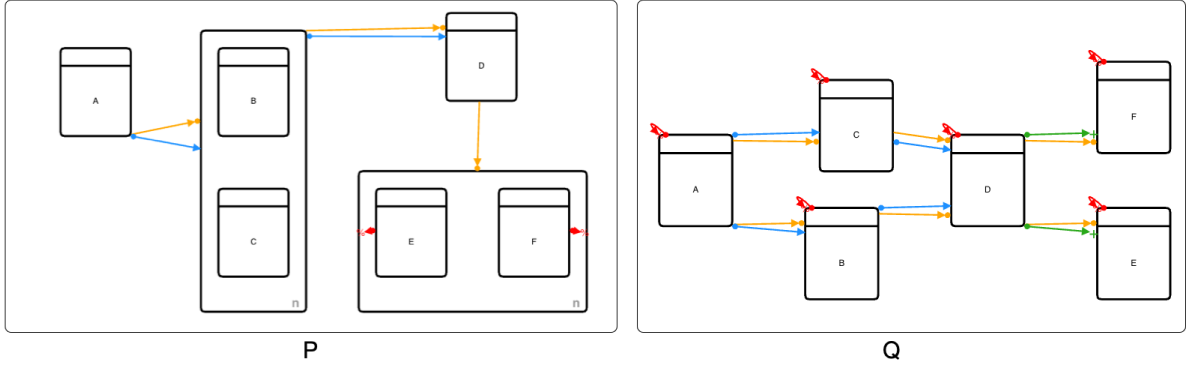
15. Consider the following DCR graph

And consider the following traces:

- $t_1 = \langle A, B, E \rangle$
- $t_2 = \langle E, D, B, C \rangle$
- $t_3 = \langle D, A, E, B, C \rangle$
- $t_4 = \langle E, B, D, C \rangle$
- $t_5 = \langle A, D, E, B, C \rangle$
- $t_6 = \langle A, B, D, C \rangle$
- $t_7 = \langle D, A, B, D \rangle$
- $t_8 = \langle A, D, B, C, A \rangle$

Choose the sets containing only accepting traces for the graph

(a) $\{t_5, t_6, t_7, t_8\}$
(b) $\{t_3, t_4, t_5, t_6\}$
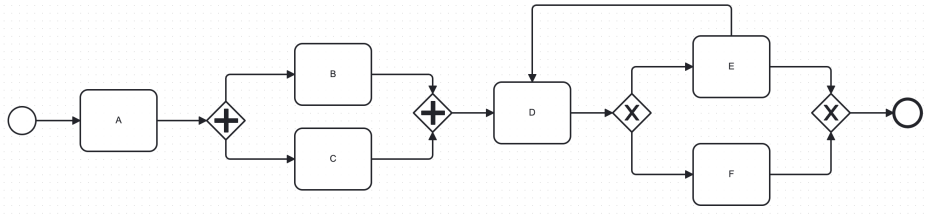(c) $\{t_2, t_3, t_4, t_5\}$
(d) $\{t_1, t_2, t_3, t_4\}$
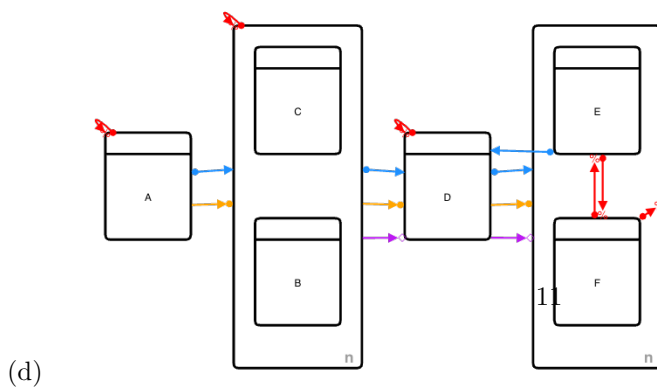
16. Consider the DCR graphs P, Q described below:
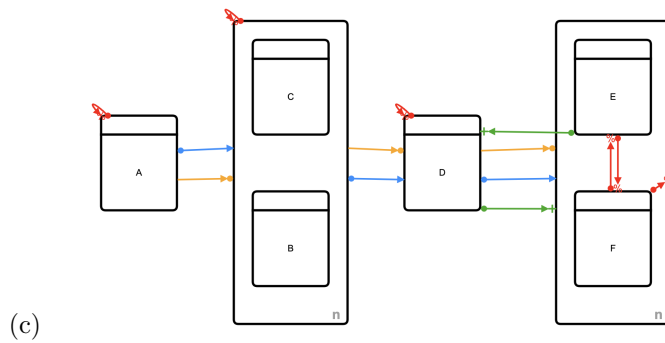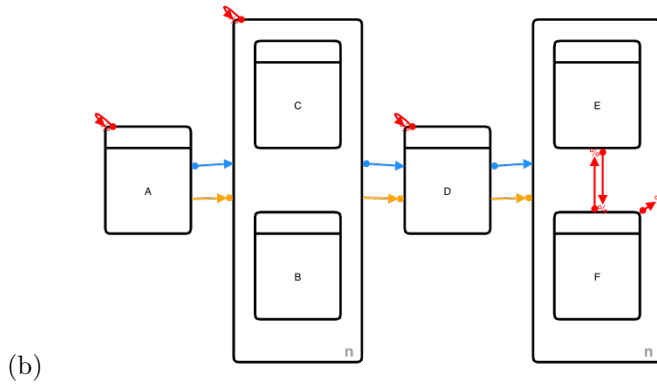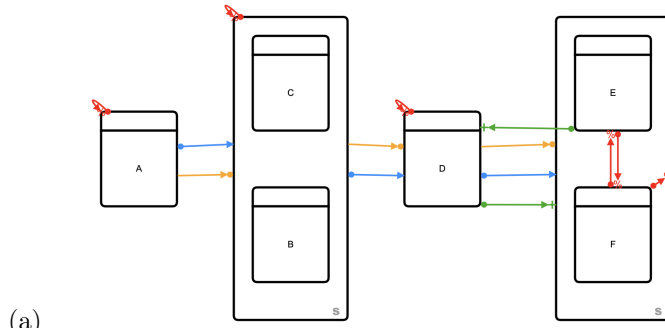

Choose the statement that best represents the relation between P and Q:

(a) $P \sqsubseteq Q$

(b) $Q \sqsubseteq P$

(c) P and Q are trace-equivalent

(d)   None of the above

17. Consider the following BPMN model

Which DCR graph is trace-equivalent to the BPMN model?

(a)

(b)

(c)

(d)

11

Section 6. Data and Decision Models

Please select the option that best fits the question.

18. Consider the DMN decision table shown below. Which of the following sentences does *NOT* hold true for that table?

	Claim.Value	Claim.TheftTime	CustomerContract.Type	Claim covered
Decide on Claim Coverage				
F	[0€;2000€]	[0;24]	{Gold, Silver, Bronze}	{yes, no}
1	[0€;200€]	-	-	yes
2	[201€;500€]	-	Gold	yes
3	[201€;500€]	[6;22]	Silver	yes
4	[201€;500€]	[8;18]	Bronze	yes
5	[501€;1000€]	[6;22]	Gold	yes
6	[501€;1000€]	[8;18]	Silver	yes
7	-	-	-	no

(a)   A claim for stolen goods worth 550 Euros will be covered only if the issuer is a gold customer.

(b)   A claim for stolen goods worth 150 Euros will always be covered.

(c)   A claim for stolen goods worth 1500 Euros will never be covered.

(d)   A claim for stolen goods worth 350 Euros will always be covered, as long as the theft happened between 8:00 A.M. and 6:00 P.M.

19. Consider the DMN decision table shown below. Which of the following sentences holds true for that table?
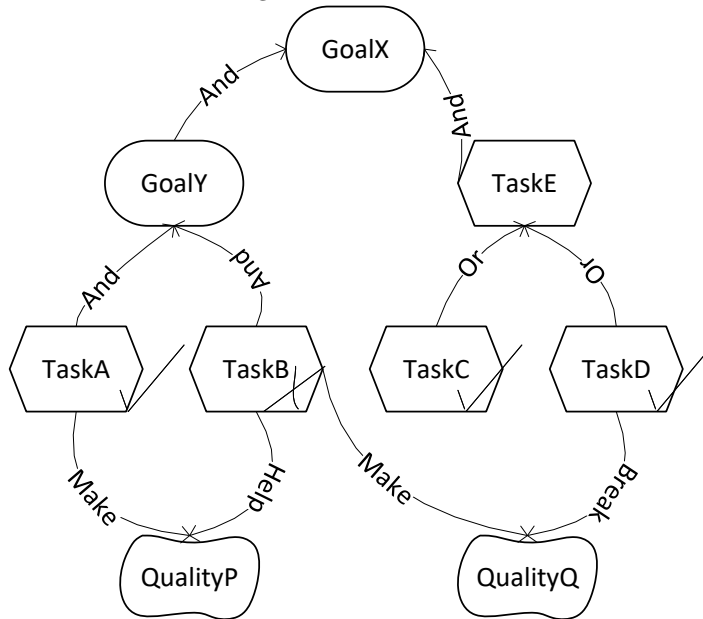
	Claim.Value	Claim.TheftTime	CustomerContract.Type	Claim covered
Decide on Claim Coverage				
U	[0€;2000€]	[0;24]	{Gold, Silver, Bronze}	{yes, no}
1	[0€;200€]	-	-	yes
2	[201€;500€]	-	Gold	yes
3	[201€;500€]	[6;22]	Silver	yes
4	[201€;500€]	[8;18]	Bronze	yes
5	[501€;1000€]	[6;22]	Gold	yes
6	[501€;1000€]	[8;18]	Silver	yes
7	> 1000€	-	-	no

(a)   The table satisfies the hit policy, but is incomplete.

(b)   The table does not satisfy the hit policy, but is complete.

(c)   The table satisfies the hit policy, and is complete.

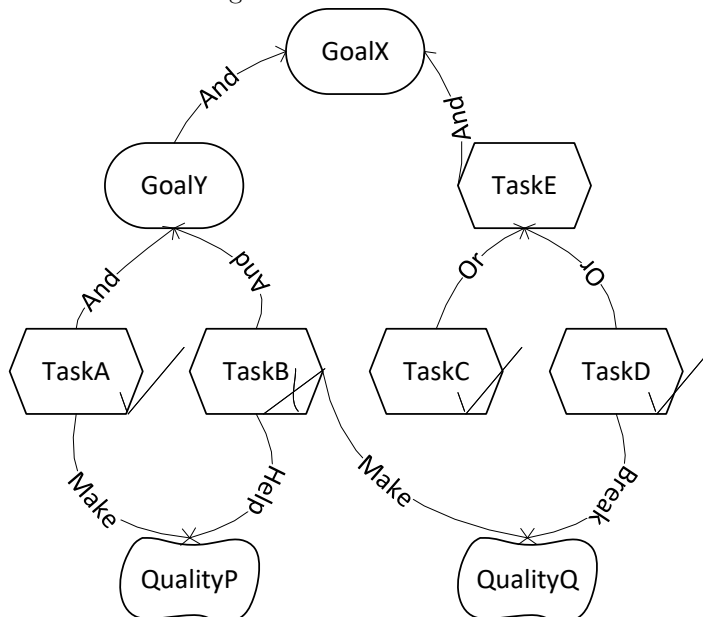(d)   The table does not satisfy the hit policy, and is incomplete.

Section 7. Requirements Engineering Models

Please select the option that best fits the question.

20. consider the i-Star goal model shown below, paying particular attention to the labels on the tasks. Which of the following sentences does *NOT* hold for that model?

(a) QualityQ has a conflict.

(b) TaskE is satisfied.

(c) GoalX is denied.

(d) QualityP is partially satisfied.

21. consider the i-Star goal model shown below. Which label would you change to *SATISFY* all goals?

(a) TaskB to satisfied.

(b) TaskD to denied.

(c) TaskC to denied.

(d) It is impossible to satisfy all goals.

22. Consider the following sentence:

    For a grade to be registered, a hand-in must be present and a grade must be valid. To ensure that the grade is valid, one must inspect the grade and sign it either with 2-factor authentication or with a stylus.

    Which of the i-Star models shown in Section 5 of the appendix correctly captures that requirement.

    (a)   Figure 5A

    (b)   Figure 5B

    (c)   Figure 5C

    (d)   Figure 5D

23. Consider the following sentence:

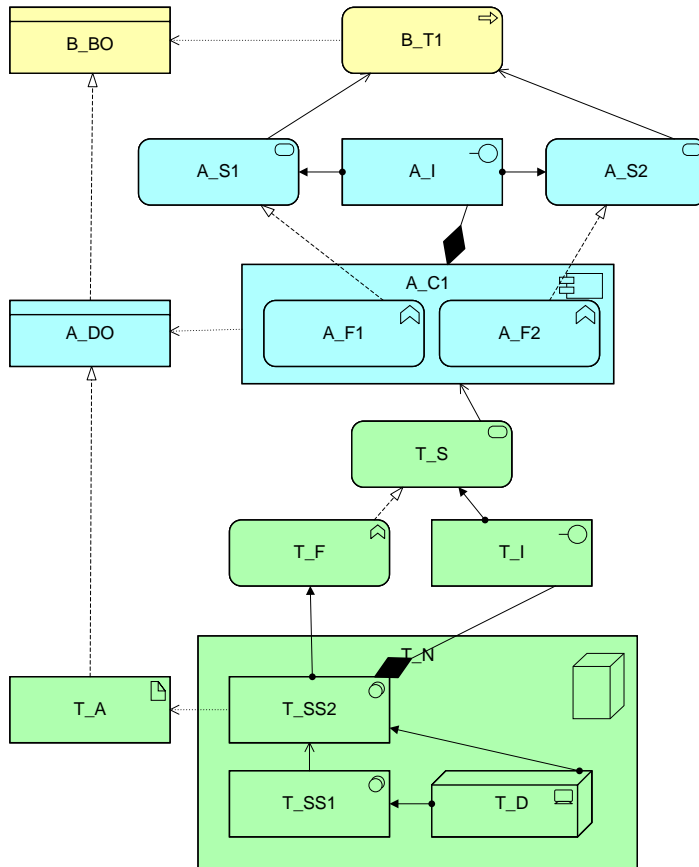   *In order for a customer to get a refund, the cashier must have printed a receipt.*

    Which of the i-Star models shown in Section 4 of the appendix correctly captures that requirement.

    (a)   Figure 4A

    (b)   Figure 4B

    (c)   Figure 4C

    (d)   Figure 4D

Section 8. Enterprise Architecture Models

Please select the option that best fits the question.

24. Consider the ArchiMate model shown below. Which of the following sentences does *NOT* hold true for that model?

   (a)   A_F1 and A_F2 can run on two different nodes.

   (b)   Both A_F1 and A_F2 support B_T1.

   (c)   T_SS2 relies on T_SS1 to be executed.

   (d)   A_S1 and A_S2 share the same interface.

25. Consider the following sentence:

To generate paychecks, the payroll office of a university relies on an accounting software developed in-house. The accounting software runs on a physical server running CentOS Linux. The accounting software relies on a PostgreSQL DBMS, which also runs on CentOS Linux but on a different physical server. Both servers run on the same network. The head of the IT department is considering migrating to a cloud-based accounting software offered under the software-as-a-service model, thus freeing its employees from maintaining the current software's codebase.

Which of the ArchiMate models shown in Section 6 of the appendix describes the *CURRENT* architecture.

   (a)   Figure 6A

   (b)   Figure 6B

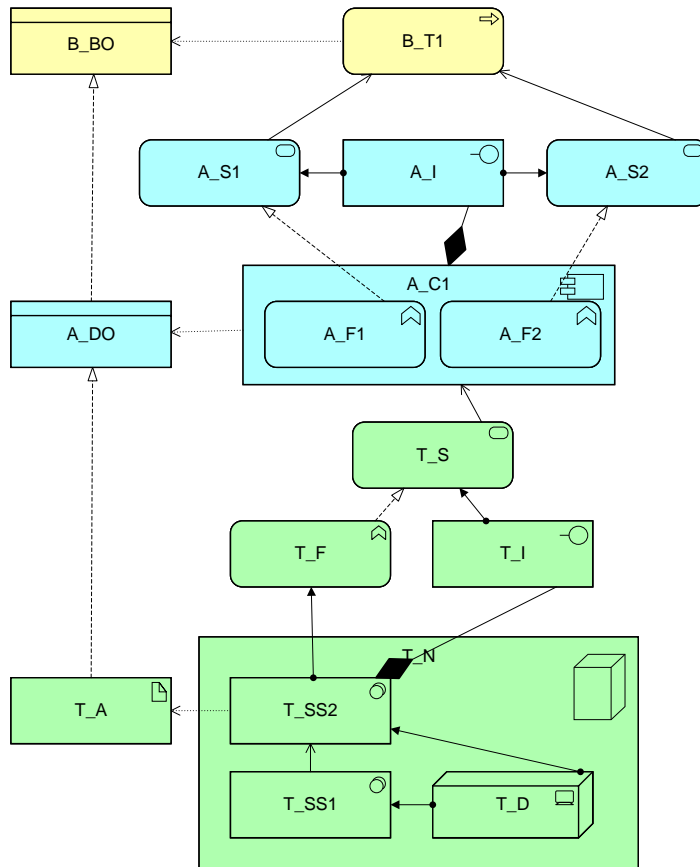   (c)   Figure 6C

   (d)   Figure 6D

15

26. Consider the following sentence:

    To generate paychecks, the payroll office of a university relies on an accounting software developed in-house. The accounting software runs on a physical server running CentOS Linux. The accounting software relies on a PostgreSQL DBMS, which also runs on CentOS Linux but on a different physical server. Both servers run on the same network. The head of the IT department is considering migrating to a cloud-based accounting software offered under the software-as-a-service model, thus freeing its employees from maintaining the current software's codebase.

    Which of the ArchiMate models shown in Section 7 of the appendix describes the *NEW* architecture.

    (a)   Figure 7A

    (b)   Figure 7B

    (c)   Figure 7C

    (d)   Figure 7D

27. Consider the ArchiMate model shown below.

    Which of the ArchiMate models shown in Section 8 of the appendix is *NOT* a view on that model?

    (a)   Figure 8A

    (b)   Figure 8B

    (c)   Figure 8C
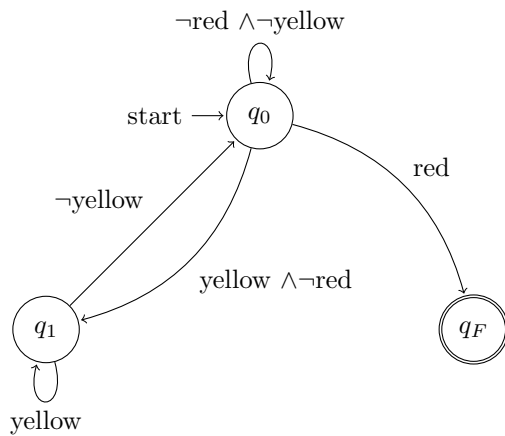
    (d)   Figure 8D

Answer Key for Exam $\boxed{\text{A}}$

Section 1. Formal Languages

Please select the option that best fits the question.

1. Consider the following automata with alphabet {yellow, green, red}

Select the description that *best* fit the behaviour of the automata:

    (a)   Eventually red

    (b)   Yellow release red

    (c)   Green until red

    (d)   Yellow until red

2. Consider the following deterministic finite state automaton (DFA), M, over the alphabet $\{0,1\}$ defined formally as $M = \{Q, \{0,1\}, \delta, q_0, F\}$, where:

$$Q = \{q_0, q_1, q_2\} \text{ is the set of states,}$$
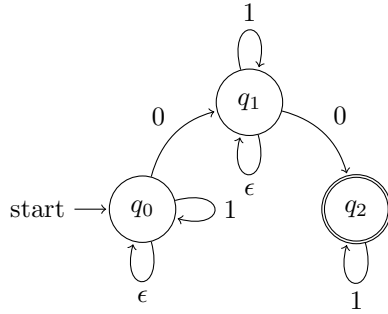$$q_0 \text{ is the initial state,}$$
$$F = \{q_2\} \text{ is the set of final states, and}$$

$$\delta(q, a) = \begin{cases} q_1 & \text{if } q = q_0 \text{ and } a = 0 \\ q_2 & \text{if } q = q_1 \text{ and } a = 1 \\ q_1 & \text{if } q = q_2 \text{ and } a = 0 \\ q_2 & \text{if } q = q_2 \text{ and } a = 1 \\ q_2 & \text{if } q = q_1 \text{ and } a = 0 \\ q_1 & \text{if } q = q_0 \text{ and } a = 1 \end{cases}$$

Which of the following strings will M accept?

    (a)   101010

    (b)   011010

    (c)   100101

    (d)   001000

3. Consider the following nondeterministic finite state automaton (NFA), N, which includes epsilon moves, over the alphabet $\{0,1\}$ defined formally as $N = \{Q, \{0,1\}, \delta, q_0, F\}$, with transition relations represented below:
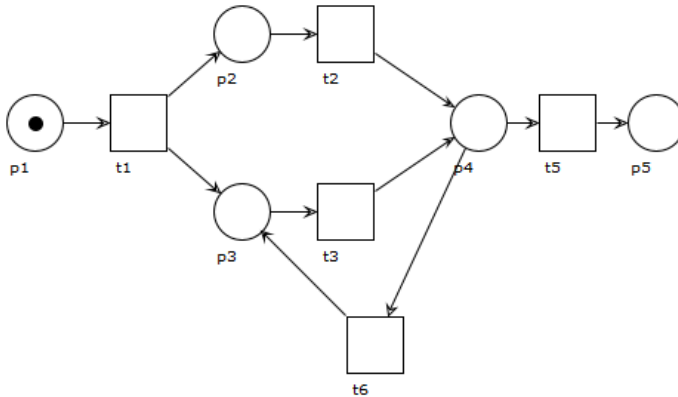

Which of the following strings will N accept?

(a) 0110
(b) 1011
(c) 0010
(d) 0

Section 2. Workflow Models
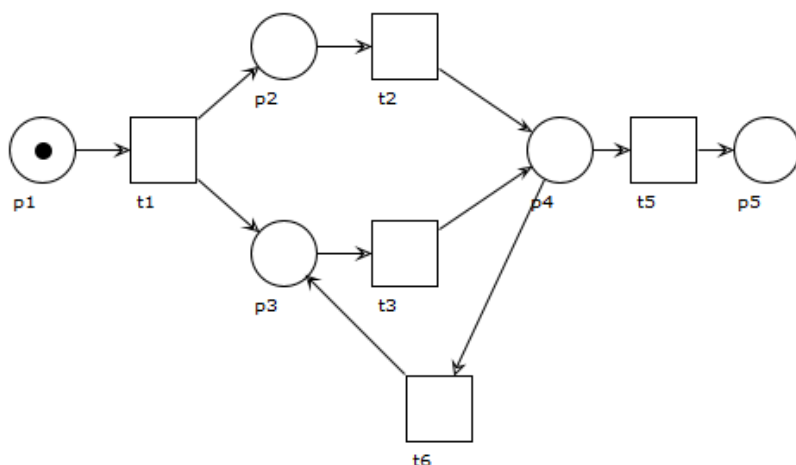
Please select the best answer fitting the question.

4. Consider the Petri Net:

Which of the reachability graphs shown in section 1 of the appendix is correct that Petri Net?

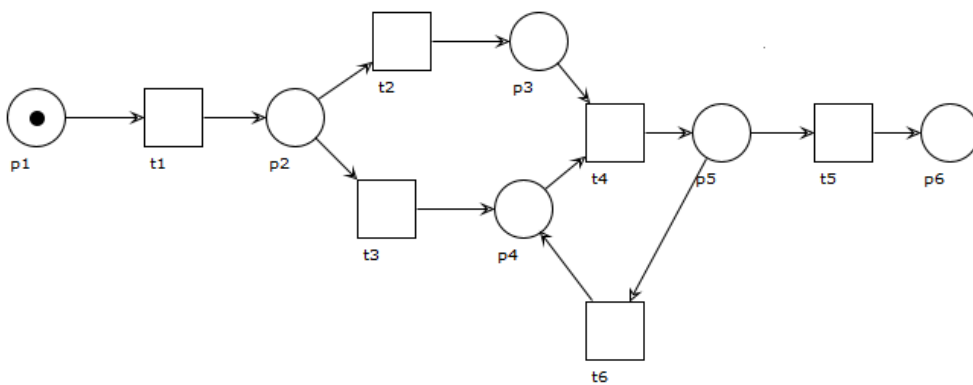(a) Figure 1A
(b) Figure 1B
(c) Figure 1C
(d) Figure 1D

5. Consider the Petri Net shown below

Which of the following options correspond to its formalization?

(a) P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(t2,p4),
(t3,p4),(p4,t5),(t5,p5),(p4,t6),(t6,p3)}.

(b) P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t4,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(t2,p4),
(t3,p4),(p4,t5),(t5,p5),(p4,t6),(t6,p3)}.

(c) P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(p3,t6),
(t2,p4),(t3,p4),(p4,t5),(t5,p5),(t6,p4)}

(d) P = {p1,p2,p3,p4,p5}, T = {t1,t2,t3,t5,t6}, F = {(p1,t1),(t1,p2),(t1,p3),(p2,t2),(p3,t3),(t2,p4),
(t3,p4),(p4,t5),(t5,p5),(p4,t6),(t6,p4)}

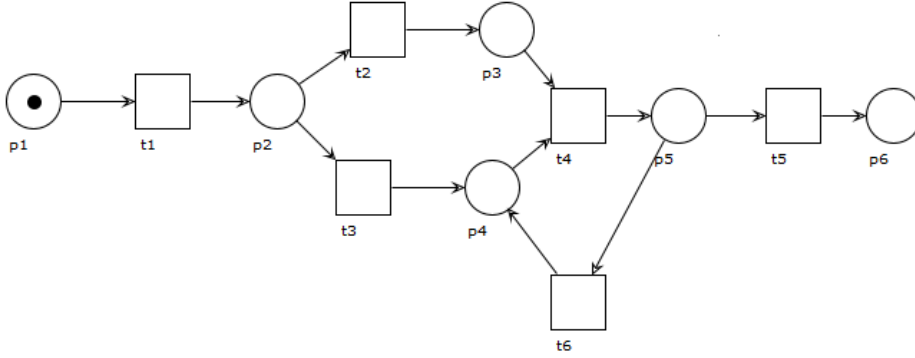6. Consider the Petri Net:

Which of the following options is a reachable marking for it?

(a) p2
(b) 2p5
(c) p3+p4
(d) p6

4

7. Consider the following Petri Net:

Which of the following sentences does NOT hold?

(a) The Petri Net is deadlock-free.

(b) Transition t6 is dead.

(c) Transitions t2 and t3 cannot appear in the same firing sequence.

(d) The Petri Net is 1-bounded.

Section 3. Models for Communicating and Distributed Systems

Please select the answer that best fits the question.

8. Consider the following CCS process expression:

$$P = a.\bar{b}.P + c.P' + 0$$

Where $P' = d.P + e.P$

Assume $\to^*$ the transitive closure of $\to$, that is, the sequence of applications of the transition rules in the operational semantics of CCS. Which of the following processes is capable of producing $P \mid Q \to^* 0$ including synchronization actions in $\to^*$?

(a) $Q = (\bar{a}.b.0 \mid \bar{c}.\bar{d}.0).0$

(b) $Q = (\nu a)(\nu b)(\bar{a}.b.Q + \bar{c}.\bar{d}.0)$

(c) $Q = \bar{a}.Q \mid b.Q \mid \bar{c}.Q \mid \bar{d}.0$

(d) $Q = \bar{a}.b.Q + \bar{c}.\bar{d}.0$

9. Consider the following CCS process expression:

$$P = a.\bar{b}.P + c.P' + 0$$

Where $P' = d.P + e.P$

Which of the following statements best describes the behavior of process P?

   (a)   Process P represents a recursive behavior where upon receiving an a action, it sends a b action and then continues to behave similarly. It also has a choice between continuing as process P' with either a d or an e action, or terminating.

   (b)   Process P can perform an a action followed by a b action, and then it must engage in process P' with either a d or an e action, repeating indefinitely.

   (c)   Process P chooses between performing an a action followed by a b action, or engaging in process P' with c and either a d or an e action, but it can eventually terminate.

   (d)   Process P starts with a choice between an a action followed by a b action and continuing as process P' with either a d or an e action. It then continues recursively without termination.

10. Consider the CCS process

$$P = (\nu\ payment)(\nu\ burger)(\nu\ pizza)(Disp \mid Susan),$$

where $Disp = payment.(\overline{burger}.Disp + \overline{pizza}.Disp)$, and $Susan = \overline{work}.\overline{payment}.burger.Susan$
Select the statements that are true:

   (a) P is a possibly locked process

   (b)   The restrictions for $payment, burger$ and $pizza$ are unnecessary in the presence of additional processes

   (c) P has a possible deadlock

   (d)   None of the above

Section 4. Imperative Process Models

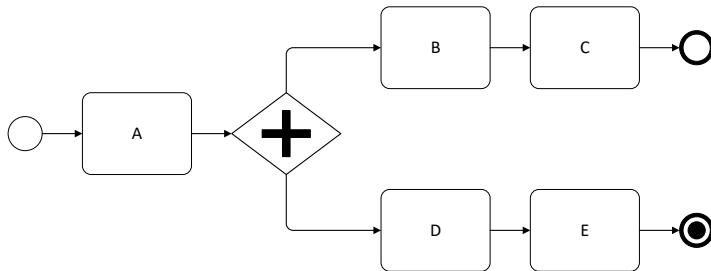Please select the option that best fits the question.

11. Consider the following process description:

> The fraud detection process of BankDK is structured as follows. If withdrawals made with a customer's credit card at ATMs exceed 15000 DKK, BankDK sends an SMS alert to the customer's mobile phone. If the customer replies to that alert with a message containing the text FRAUD, BankDK blocks the customer's credit card. If no message is received after 3 days since the SMS was sent, the process ends.

Which of the BPMN collaboration diagrams shown in Section 2 of the appendix does *NOT* correctly capture that process description?

   (a)   Figure 2A

   (b)   Figure 2B
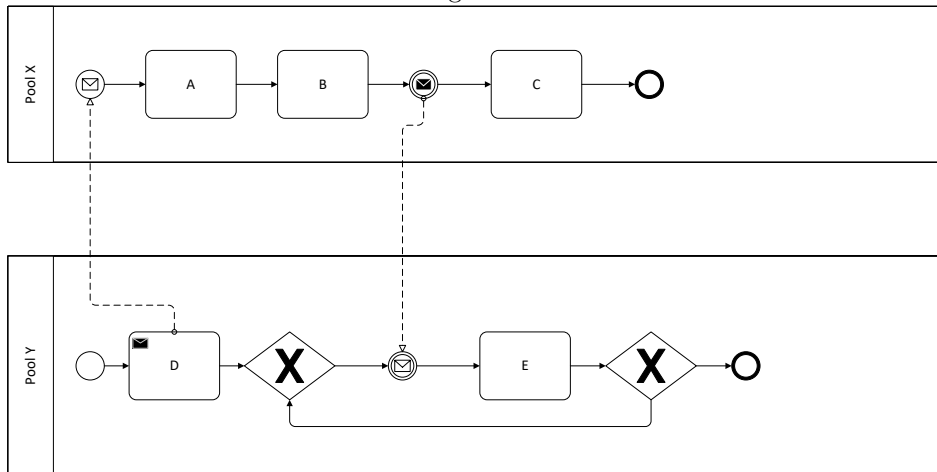
   (c)   Figure 2C

   (d)   Figure 2D

12. Consider the BPMN process diagram below:

Which of the following sentences holds true for the model?

(a)   The process can possibly end immediately after executing task B.

(b)   The process can possibly end immediately after executing task D.

(c)   The process can possibly end immediately after executing task A.

(d)   Task B and task D are mutually exclusive.

13. Consider the BPMN collaboration diagram below:

Which of the following sentences holds true for that model?

(a)   There is a deadlock in the process belonging to PoolY.

(b)   There is a deadlock in the process belonging to PoolX.

(c)   Both processes are deadlock-free.

(d)   Task E can always be executed more than once.

14. Consider the following sentence:

> AlText is a publisher of printed academic textbooks and scientific journals. When the paper rolls that AlText has in stock fall below 500 rolls, a request for a quote for 2000 rolls is prepared and sent to one of its supplier. The supplier, upon reception of the request, verifies if it has enough paper rolls in its warehouses. If the supplier does not have enough rolls, it terminates its process by informing AlText. AlText then sends the request for a quote again to another supplier. If a supplier has enough rolls available, it prepares a quote, which is sent to AlText. If, after assessing the quote, AlText is satisfied with it, AlText notifies the supplier that the quote has been accepted, the supplier registers the order, and the process ends on both sides. If AlText is not satisfied with the quote, it sends the request for a quote again to another supplier. If a supplier does not receive the notification within 10 days since the quote was sent, it ends the process.

Which of the BPMN collaboration diagrams shown in Section 3 of the appendix correctly captures that process description.
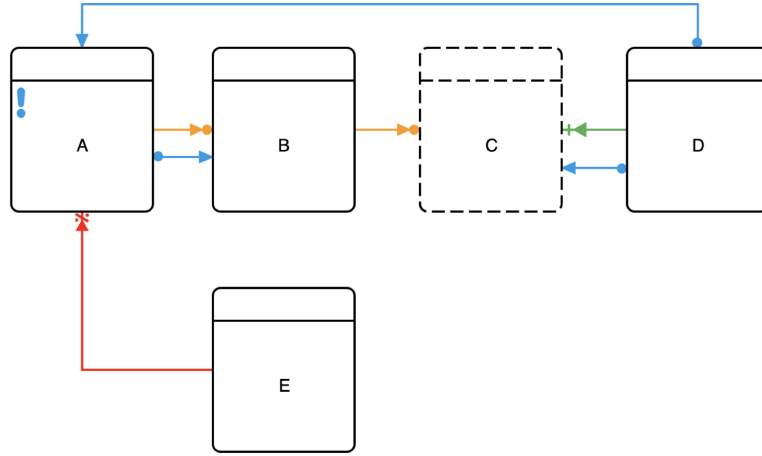
(a)   Figure 3A
(b)   Figure 3B
(c)   Figure 3C
(d)   Figure 3D

Section 5. Declarative Process Models

Please select the option that best fits the question.
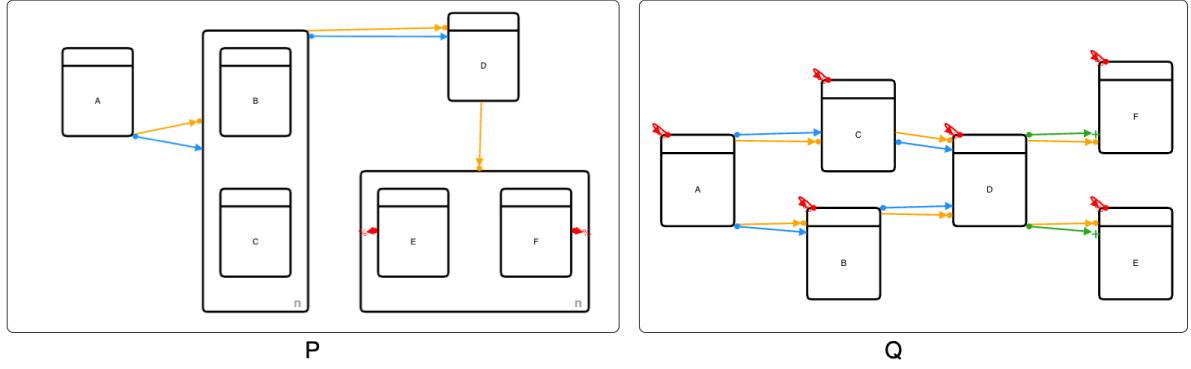
15. Consider the following DCR graph

And consider the following traces:

- $t_1 = \langle A, B, E \rangle$

- $t_2 = \langle E, D, B, C \rangle$

- $t_3 = \langle D, A, E, B, C \rangle$

- $t_4 = \langle E, B, D, C \rangle$

- $t_5 = \langle A, D, E, B, C \rangle$

- $t_6 = \langle A, B, D, C \rangle$

- $t_7 = \langle D, A, B, D \rangle$

- $t_8 = \langle A, D, B, C, A \rangle$

Choose the sets containing only accepting traces for the graph

(a) $\{t_5, t_6, t_7, t_8\}$
(b) $\{t_3, t_4, t_5, t_6\}$
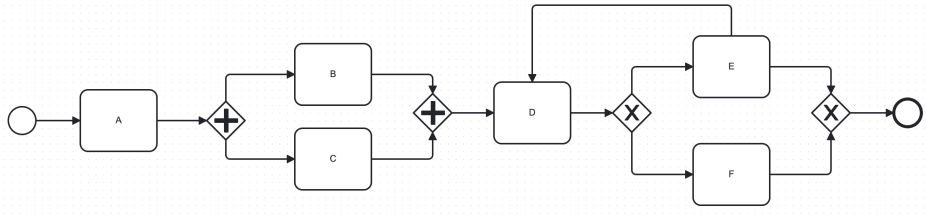(c) $\{t_2, t_3, t_4, t_5\}$
(d) $\{t_1, t_2, t_3, t_4\}$

16. Consider the DCR graphs P, Q described below:
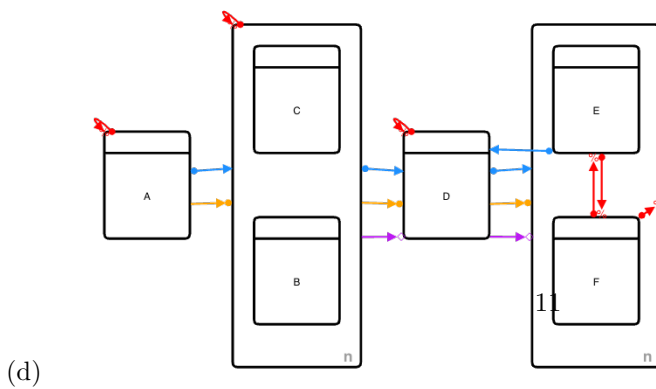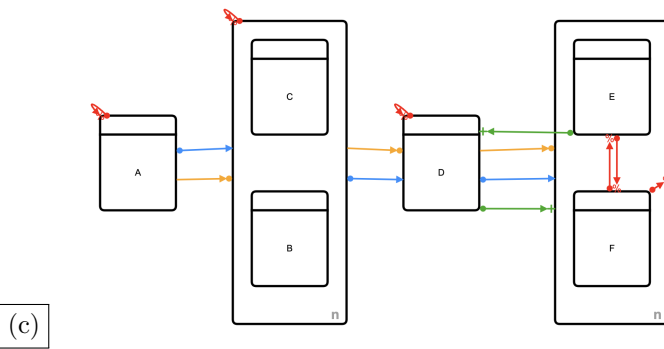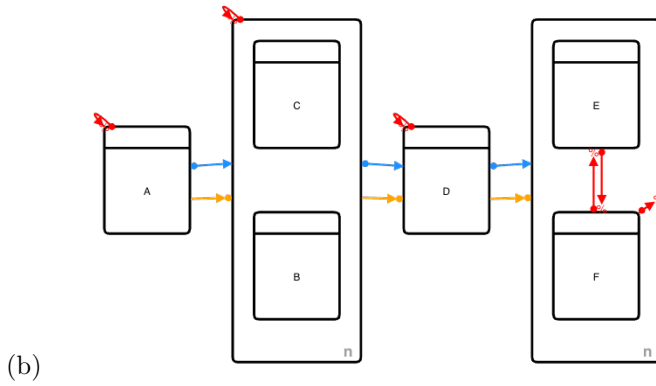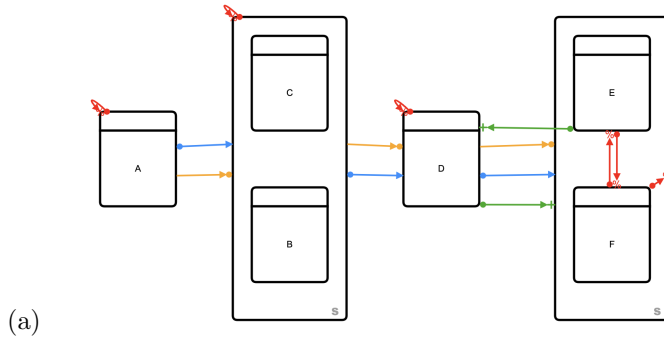

Choose the statement that best represents the relation between P and Q:

(a) $P \sqsubseteq Q$

(b) $Q \sqsubseteq P$

(c) P and Q are trace-equivalent

(d)   None of the above

17. Consider the following BPMN model

Which DCR graph is trace-equivalent to the BPMN model?

(a)

(b)

(c)

(d)

Section 6. Data and Decision Models

Please select the option that best fits the question.

18. Consider the DMN decision table shown below. Which of the following sentences does *NOT* hold true for that table?

Decide on Claim Coverage			
F	*Claim.Value*	*Claim.TheftTime*	*CustomerContract.Type*	*Claim covered*
	[0€;2000€]	*[0;24]*	*{Gold, Silver, Bronze}*	*{yes, no}*
1	[0€;200€]	-	-	yes
2	[201€;500€]	-	Gold	yes
3	[201€;500€]	[6;22]	Silver	yes
4	[201€;500€]	[8;18]	Bronze	yes
5	[501€;1000€]	[6;22]	Gold	yes
6	[501€;1000€]	[8;18]	Silver	yes
7	-	-	-	no

(a) A claim for stolen goods worth 550 Euros will be covered only if the issuer is a gold customer.

(b) A claim for stolen goods worth 150 Euros will always be covered.

(c) A claim for stolen goods worth 1500 Euros will never be covered.

(d) A claim for stolen goods worth 350 Euros will always be covered, as long as the theft happened between 8:00 A.M. and 6:00 P.M.

19. Consider the DMN decision table shown below. Which of the following sentences holds true for that table?
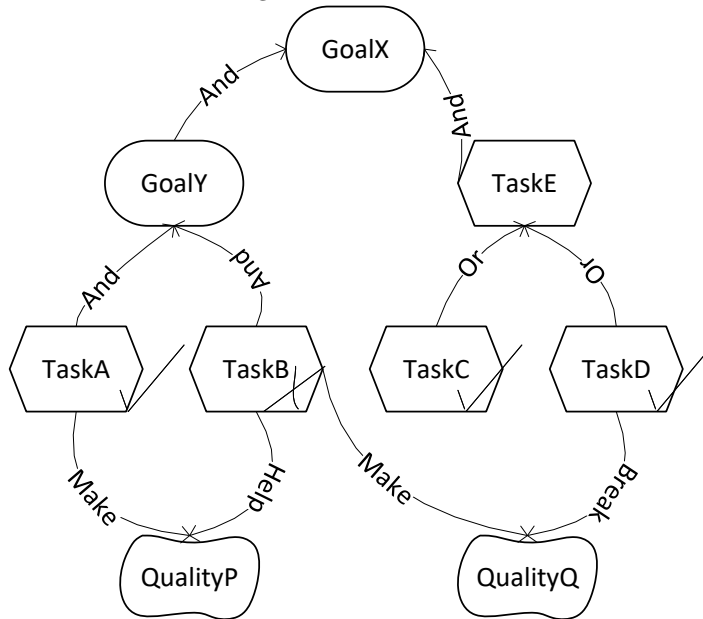
Decide on Claim Coverage			
U	*Claim.Value*	*Claim.TheftTime*	*CustomerContract.Type*	*Claim covered*
	[0€;2000€]	*[0;24]*	*{Gold, Silver, Bronze}*	*{yes, no}*
1	[0€;200€]	-	-	yes
2	[201€;500€]	-	Gold	yes
3	[201€;500€]	[6;22]	Silver	yes
4	[201€;500€]	[8;18]	Bronze	yes
5	[501€;1000€]	[6;22]	Gold	yes
6	[501€;1000€]	[8;18]	Silver	yes
7	> 1000€	-	-	no

(a) The table satisfies the hit policy, but is incomplete.
(b) The table does not satisfy the hit policy, but is complete.
(c) The table satisfies the hit policy, and is complete.
(d) The table does not satisfy the hit policy, and is incomplete.

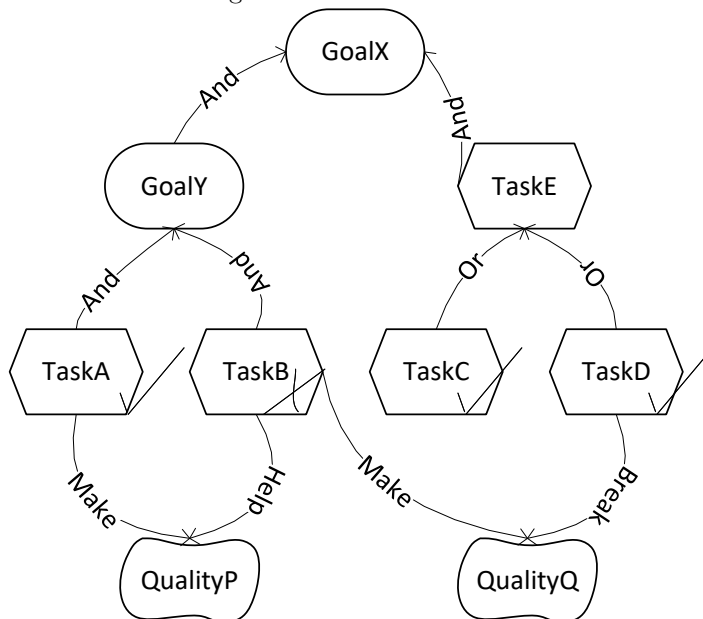## Section 7. Requirements Engineering Models

Please select the option that best fits the question.

20. consider the i-Star goal model shown below, paying particular attention to the labels on the tasks. Which of the following sentences does *NOT* hold for that model?

(a) QualityQ has a conflict.

(b) TaskE is satisfied.

(c) GoalX is denied.

(d) QualityP is partially satisfied.

21. consider the i-Star goal model shown below. Which label would you change to *SATISFY* all goals?

(a) TaskB to satisfied.

(b) TaskD to denied.

(c) TaskC to denied.

(d) It is impossible to satisfy all goals.

22. Consider the following sentence:

    For a grade to be registered, a hand-in must be present and a grade must be valid. To ensure that the grade is valid, one must inspect the grade and sign it either with 2-factor authentication or with a stylus.

    Which of the i-Star models shown in Section 5 of the appendix correctly captures that requirement.

    (a)   Figure 5A

    (b)   Figure 5B

    (c)   Figure 5C

    (d)   Figure 5D

23. Consider the following sentence:

    In order for a customer to get a refund, the cashier must have printed a receipt.
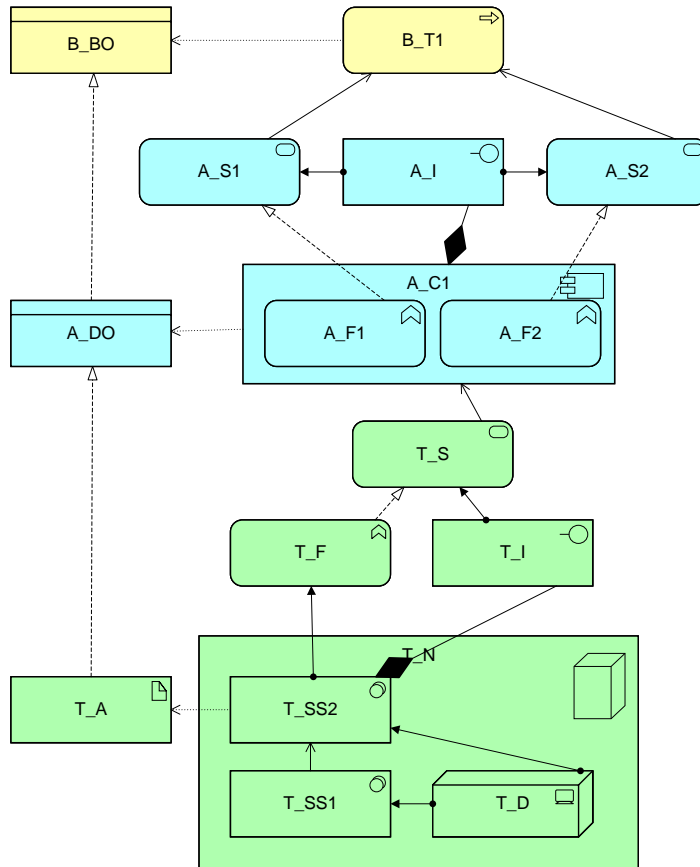
    Which of the i-Star models shown in Section 4 of the appendix correctly captures that requirement.

    (a)   Figure 4A

    (b)   Figure 4B

    (c)   Figure 4C

    (d)   Figure 4D

Section 8. Enterprise Architecture Models

Please select the option that best fits the question.

24. Consider the ArchiMate model shown below. Which of the following sentences does *NOT* hold true for that model?

   (a)   A_F1 and A_F2 can run on two different nodes.

   (b)   Both A_F1 and A_F2 support B_T1.

   (c)   T_SS2 relies on T_SS1 to be executed.

   (d)   A_S1 and A_S2 share the same interface.

25. Consider the following sentence:

To generate paychecks, the payroll office of a university relies on an accounting software developed in-house. The accounting software runs on a physical server running CentOS Linux. The accounting software relies on a PostgreSQL DBMS, which also runs on CentOS Linux but on a different physical server. Both servers run on the same network. The head of the IT department is considering migrating to a cloud-based accounting software offered under the software-as-a-service model, thus freeing its employees from maintaining the current software's codebase.

Which of the ArchiMate models shown in Section 6 of the appendix describes the *CURRENT* architecture.

   (a)   Figure 6A

   (b)   Figure 6B

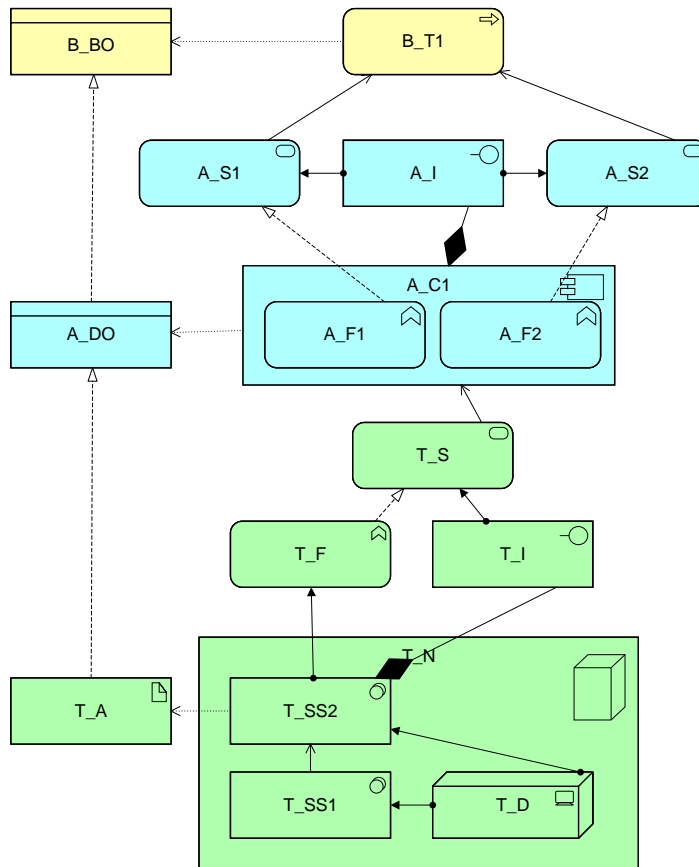   (c)   Figure 6C

   (d)   Figure 6D

26. Consider the following sentence:

    To generate paychecks, the payroll office of a university relies on an accounting software developed in-house. The accounting software runs on a physical server running CentOS Linux. The accounting software relies on a PostgreSQL DBMS, which also runs on CentOS Linux but on a different physical server. Both servers run on the same network. The head of the IT department is considering migrating to a cloud-based accounting software offered under the software-as-a-service model, thus freeing its employees from maintaining the current software's codebase.

    Which of the ArchiMate models shown in Section 7 of the appendix describes the *NEW* architecture.

    (a)   Figure 7A

    (b)   Figure 7B

    (c)   Figure 7C

    (d)   Figure 7D

27. Consider the ArchiMate model shown below.

    Which of the ArchiMate models shown in Section 8 of the appendix is *NOT* a view on that model?

    (a)   Figure 8A

    (b)   Figure 8B

    (c)   Figure 8C

    (d)   Figure 8D