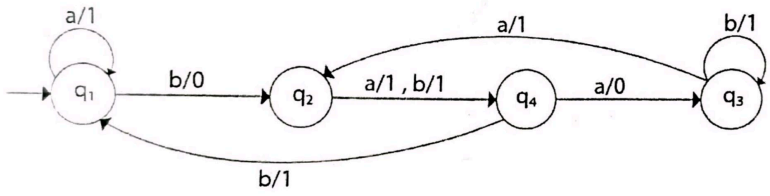
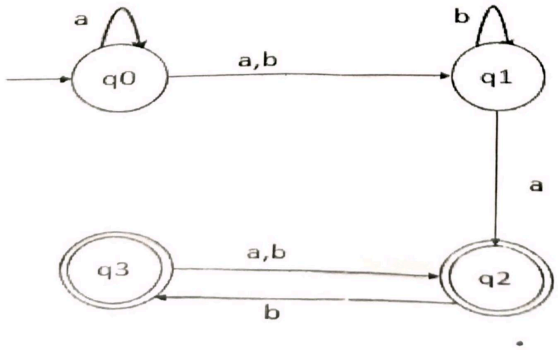
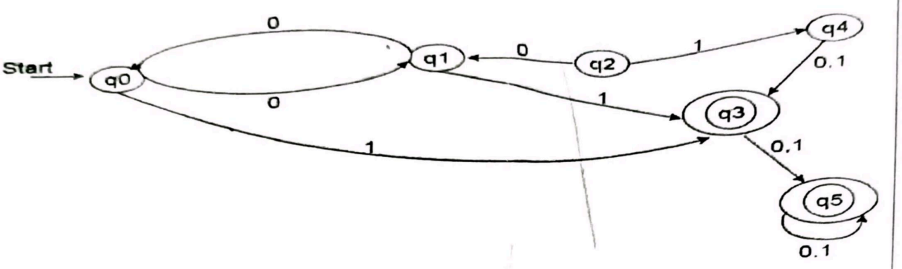
Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	1	**Course Coordinator(s)**	Prof. Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST		**Roll Number**	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	DistinguishKleen Closure and Kleen Positive with suitable example.	CO1, L2	2
Q2	Design a DFA for |w| mod 4=2 over alphabet set{ a , b }	CO4, L6	2
Q3	Articulate the following Mealy machine into equivalent Moore machine. 	CO4, L3	4
Q4	Explain Chomsky Classification of Languages in detail.	CO2, L1	4
Q5	Consider a Non-deterministic finite automata (NFA) and convert that NFA into equivalent Deterministic Finite Automata (DFA). 	CO1, L5	4
Q6	Illustrate theneed for minimization of automata and minimize the following Finite Automata:	CO1, L4	8



Course Outcomes (CO)

Students will be able to

1	Identify the different concepts in automata theory- deterministic automata, regular expressions, regular languages, context-free grammars, context-free languages and Turing machines
2	Demonstrate the various categories of languages and grammars in the Chomsky hierarchy
3	Illustrate the finite automata, regular expressions and context-free grammars accepting or generating a certain language.
4	Design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
5	Contrast the computational strengths and weaknesses of these machines
6	Utilize automata concepts and techniques in designing systems that address real world problems.

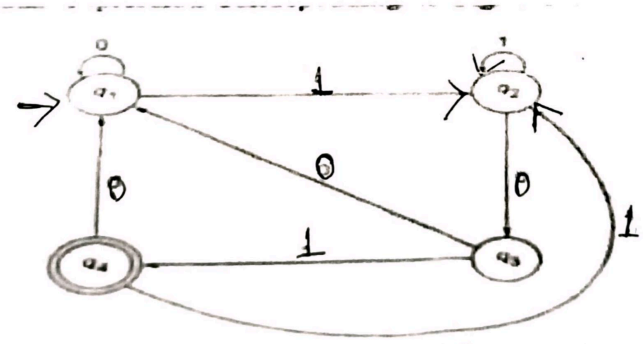
BT Classification	**Lower Order Thinking Levels (LOTS)**			**Higher Order Thinking Levels (HOTS)**		
BT Level Number	L1	L2	L3	L4	L5	L6
BT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	2	**Course Coordinator(s)**	Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST		**Roll Number**	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	List the applications of Context Free Grammar	CO1, L1	2
Q2	Is NDPDA more powerful than DPDA? Justify with suitable example.	CO5, L2	2
Q3	Explain ambiguity of Context free languages. Test whether the following language is ambiguous or not. S -> S1S | 0	CO5, L2	4
Q4	State Pumping Lemma for Regular Grammar. Show that the set L= { a^p | p is prime } is not regular.	CO3, L3	4
Q5	Illustrate Arden's theorem. Convert the following automata into regular expression. 	CO6, L4	4
Q6	Define Greibach Normal Form. Convert the following Grammar into Greibach Normal Form (GNF): S-> XA | BB, B-> SB | b, X->b , A-> a	CO1, L6	8

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Pages: 2]

[Total No. of Questions: 09]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Theory of Computation
Subject Code: PCIT-112
Paper ID: 16443

Max. Marks: 60

Time Allowed: 03 Hours

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Can you recall the different types of alphabets used in formal languages?
b) Explain Chomsky's classification of languages and its significance.
c) Compare and contrast the closure properties of different language classes.
d) How are languages related in terms of inclusion and equality? Give examples to illustrate these relationships.
e) Define the concept of acceptance by a Finite Automaton.
f) State the pumping lemma for regular languages.

Part – B **[Marks: 04 each]**

Q2. Compare and contrast Moore and Mealy machines in terms of their structure and functionality.

Q3. Design a Finite Automaton that recognizes a specific language described in words. Explain Arden's theorem in the context of regular grammars.

Q4. Create a regular grammar for a language that accepts all strings over the alphabet {0, 1} that end with '01'. Convert the regular expression (0+1)* into an equivalent finite automaton.

Q5. Construct a finite automaton for a language that accepts strings with alternating '0's and '1's.

Q6. Demonstrate the equivalence between DFA and NDFA for a specific language.

Q7. Evaluate the limitations of Turing Machines in solving certain types of problems and discuss potential alternatives.

[Marks: 12 each]

Part – C

Q8. Explain the Pumping Lemma and its significance in the theory of context-free languages. Develop a formal language that cannot be expressed by regular grammar and explain why.

OR

Provide an example of a language that can be accepted by a Pushdown Automaton. Evaluate the statement: "Pushdown Automata can recognize more languages than Finite Automata." Is this true or false?

Q9. a) Create a set of closure properties for a novel language class and discuss its potential applications. Explain the concept of closure properties in the context of formal languages.

b) Break down the steps involved in solving the Halting problem and explain the challenges associated with it.

OR

a) Critically evaluate the limitations of context-sensitive languages in terms of computational efficiency and practical implementation. How do these limitations impact the broader field of formal languages and automata theory?

b) Propose a theoretical scenario where the Post Correspondence Problem can be utilized in a real-world application.

****

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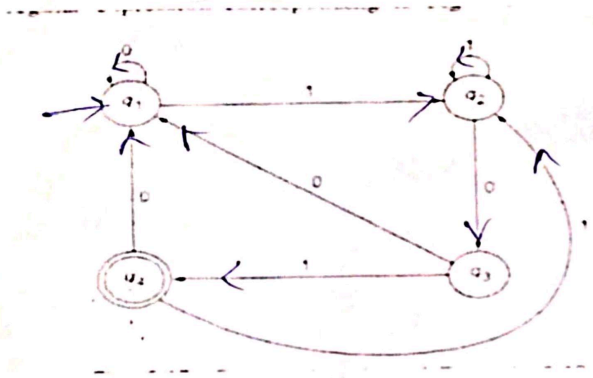
Guru Nanak Dev Engineering College, Ludhiana			
Department of Information Technology			
Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	2	**Course Coordinator(s)**	Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST	15th November, 2022	**Roll Number**	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	List the applications of Context Free Grammar	CO1, L1	2
Q2	Elaborate sentential form with suitable example	CO4, L2	2
Q3	Explain ambiguity of Context free languages. Test whether the following language is ambiguous or not. S -> S1S | 0	CO5, L3	4
Q4	State Pumping Lemma for Regular Grammar. Show that the set L= { a^p | p is prime } is not regular.	CO3, L4	4
Q5	Illustrate Arden's theorem. Convert the following automata into regular expression. 	CO6, L4	4
	Please turn over page for Q6.		

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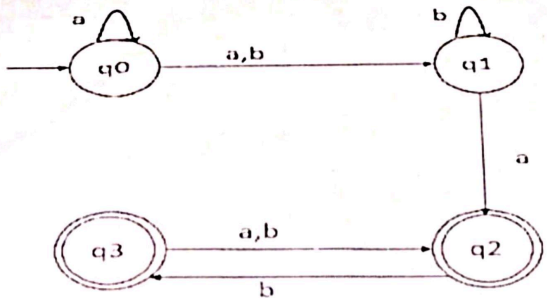
Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	1	**Course Coordinator(s)**	Prof. Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST	29 Sep,2022	**Roll Number**	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	Distinguish Kleen Closure and Kleen Positive with suitable example	CO1, L1	2
Q2	Generate a regular expression for |w| mod 4=2 over alphabet set{ a , b }	CO3, L6	2
Q3	Differentiate Moore and Mealy Machines along with valid diagrams of both.	CO4, L4	4
Q4	Explain Chomsky Classification of Languages in detail.	CO2, L2	4
Q5	Consider a Non-deterministic finite automata (NFA) and convert that NFA into equivalent Deterministic Finite Automata (DFA). 	CO4, L5	4
Q6	Define need for minimization and minimize the following Deterministic Finite Automata	CO1, L6	8

Guru Nanak Dev Engineering College, Ludhiana			
Department of Information Technology			
Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	2	**Course Coordinator(s)**	Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST		**Roll Number**	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	List the applications of Context Free Grammar	CO1, L1	2
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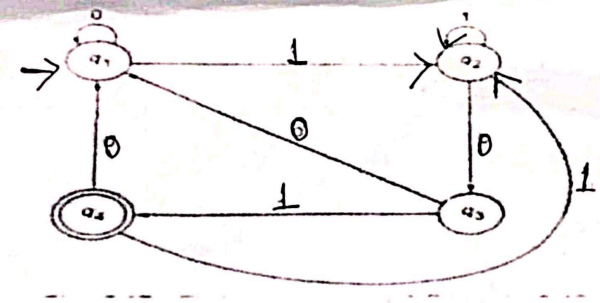
Q3	Explain ambiguity of Context free languages. Test whether the following language is ambiguous or not. S -> S1S | 0	CO5, L2	4
Q4	State Pumping Lemma for Regular Grammar. Show that the set L= { a^p | p is prime } is not regular.	CO3, L3	4
Q5	Illustrate Arden's theorem. Convert the following automata into regular expression. 	CO6, L4	4
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Guru Nanak Dev Engineering College, Ludhiana			
Department of Information Technology			
Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	1	**Course Coordinator(s)**	Prof. Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST		**Roll Number**	

Note: Attempt all questions

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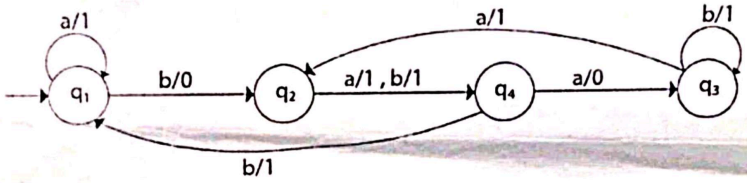
Q3	Articulate the following Mealy machine into equivalent Moore machine. 	CO4, L3	4
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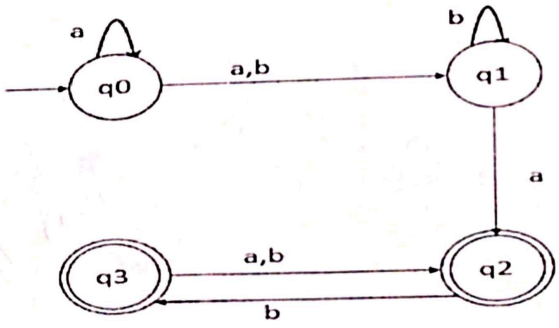
Q5	Consider a Non-deterministic finite automata (NFA) and convert that NFA into equivalent Deterministic Finite Automata (DFA). 	CO1, L5	4
Q6	Illustrate theneed for minimization of automata and minimize the following Finite Automata:	CO1, L4	8

Guru Nanak Dev Engineering College, Ludhiana			
Department of Information Technology			
Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
Mid Semester Test (MST) No.	1	**Course Coordinator(s)**	Prof. Rupinder Kaur
Max. Marks	24	**Time Duration**	1 hour 30 minutes
Date of MST	29 Sep,2022	**Roll Number**	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
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Q3	Differentiate Moore and Mealy Machines along with valid diagrams of both.	CO4, L4	4
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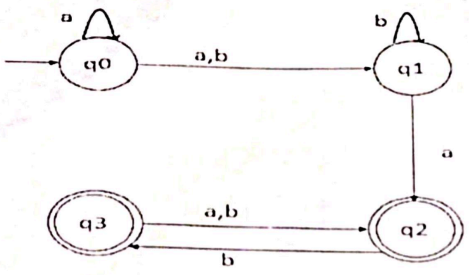
Q5	Consider a Non-deterministic finite automata (NFA) and convert that NFA into equivalent Deterministic Finite Automata (DFA). 	CO4, L5	4
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Guru Nanak Dev Engineering College, Ludhiana			
Department of Information Technology			
Program	B.Tech.(IT)	**Semester**	5th
Subject Code	PCIT-112	**Subject Title**	Theory of Computation
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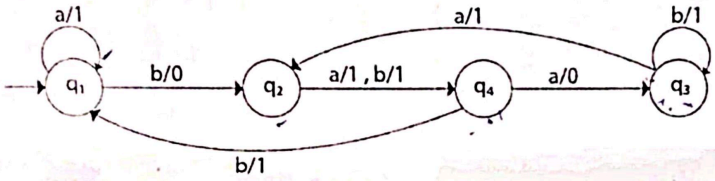
Q3	Articulate the following Mealy machine into equivalent Moore machine. 	CO4, L3	4
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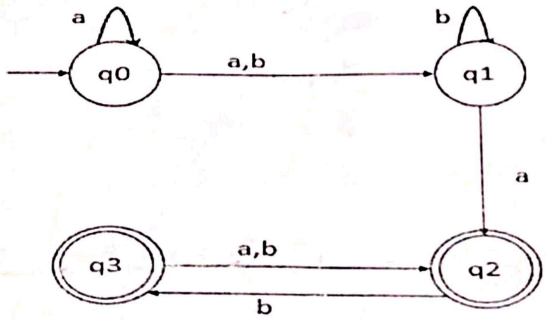
Q5	Consider a Non-deterministic finite automata (NFA) and convert that NFA into equivalent Deterministic Finite Automata (DFA). 	CO1, L5	4
	Illustrate theneed for minimization of automata and minimize the following Finite Automata:	CO1, L4	8

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09] [Total No. of Pages: 2.]

Uni. Roll No. 2..1..6..9..5..1..4

Program: B.Tech. (Batch 2018 onward)

Semester: 5th

Name of Subject: Theory of Computation

Subject Code: PCIT-112

Paper ID: 16443

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Can you recall the different types of alphabets used in formal languages?

b) Explain Chomsky's classification of languages and its significance.

c) Compare and contrast the closure properties of different language classes.

d) How are languages related in terms of inclusion and equality? Give examples to illustrate these relationships.

e) Define the concept of acceptance by a Finite Automaton.

f) State the pumping lemma for regular languages.

Part – B **[Marks: 04 each]**

Q2. Compare and contrast Moore and Mealy machines in terms of their structure and functionality.

Q3. Design a Finite Automaton that recognizes a specific language described in words. Explain Arden's theorem in the context of regular grammars.

Q4. Create a regular grammar for a language that accepts all strings over the alphabet {0, 1} that end with '01'. Convert the regular expression (0+1)* into an equivalent finite automaton.

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Q6. Demonstrate the equivalence between DFA and NDFA for a specific language.

Q7. Evaluate the limitations of Turing Machines in solving certain types of problems and discuss potential alternatives.

Part – C **[Marks: 12 each]**

Q8. Explain the Pumping Lemma and its significance in the theory of context-free languages. Develop a formal language that cannot be expressed by regular grammar and explain why.

OR

Provide an example of a language that can be accepted by a Pushdown Automaton. Evaluate the statement: "Pushdown Automata can recognize more languages than Finite Automata." Is this true or false?

Q9. a) Create a set of closure properties for a novel language class and discuss its potential applications. Explain the concept of closure properties in the context of formal languages.

b) Break down the steps involved in solving the Halting problem and explain the challenges associated with it.

OR

a) Critically evaluate the limitations of context-sensitive languages in terms of computational efficiency and practical implementation. How do these limitations impact the broader field of formal languages and automata theory?

b) Propose a theoretical scenario where the Post Correspondence Problem can be utilized in a real-world application.

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Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]
Uni. Roll No. .....

[Total No. of Pages: 02]

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Theory of Computation
Subject Code: PCIT-112
Paper ID: 16443
Scientific calculator is NotAllowed

MORNING
09 MAY 2023

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Qucstions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) List the applications of Context Free Grammar.
b) Explain Left -most derivation and right- most derivation tree along with suitable diagram.
c) Articulate grammar for set of all strings starting and ending with different symbol over alphabet set {a, b}.
d) Demonstrate Chomsky Normal Form with example.
e) Is NDPDA more powerful than DPDA? Justify.
f) Differentiate Kleen Star and Kleen Positive.

Part – B **[Marks: 04 each]**

Q2. List the properties of LR (k) Grammar.

Q3. Discuss in detail model of finite automata.

Q4. Explain Halting Problem of Turing Machine.

Q5. Differentiate Moore and Mealy Machines.

Q6. Design a PDA for odd number of palindromes.

P.T.O.

Q7. Compare and contrast Push Down Automata with Turing Machine.

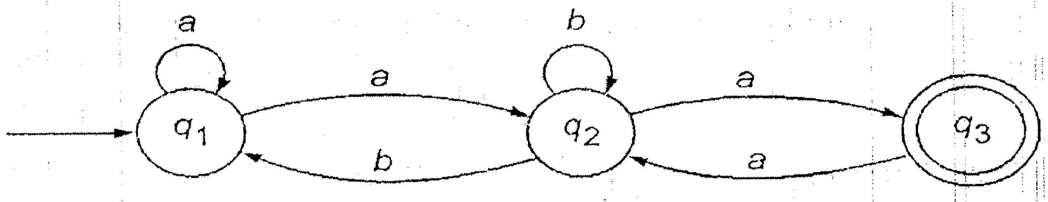
Part – C **[Marks: 12 each]**

Q8. Describe Chomsky Classification of Languages in detail.

OR

State Pumping Lemma for regular languages. Show that L= {a^p |where p is prime} is not regular.

Q9. Construct a regular expression corresponding to the automata given using Arden's Theorem:



OR

Formulate a grammar in Greibach Normal Form equivalent to grammar:

S -> AA | a

A -> SS | b

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Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: **Theory of Computation**
Subject Code: **PCIT-112**
Paper ID: **16443**

EVENING

04 JAN 2023

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Differentiate between Pushdown Automata and Turing Machine.
b) Describe the Recursively Enumerable Language with example.
c) Prove that for any transition function δ and for any two input strings x and y, $\delta(q, xy) = \delta(\delta(q, x), y)$
d) Let L be the set of all palindromes over {a,b}. Construct a grammar G generating L.
e) Let G = ({S, A1} , {0,1,2} , P, S) where P consists of
$S \rightarrow 0SA_1 2,\ S \rightarrow 012,\ 2A_1 \rightarrow A_1 2,\ 1A_1 \rightarrow 11$
Find L(G).
f) Prove that following regular expressions are equivalent.
$aa(b^* + a) + a(ab^* + aa) = aa(b^* + a)$

Part – B **[Marks: 04 each]**

Q2. How Noam Chomsky classified the formal languages? Discuss each class with the help of suitable examples. Also name the automata accepting these languages.

Q3. Discuss in detail Linear Bounded Automata.

Q4. State and prove pumping lemma for regular grammars.

EVENING

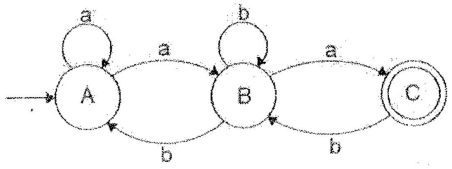
04 JAN 2023

Q5. Given the grammar $S \rightarrow AB, A \rightarrow a$, $B \rightarrow C \mid b$, $C \rightarrow D$, $D \rightarrow E, E \rightarrow a$, find an equivalent grammar which is reduced and has no unit productions.

Q6. Construct a minimum state automaton equivalent to Finite Automata given below:

STATE	INPUT	
	a	b
→q_0	q_1	q_2
q_1	q_4	q_3
q_2	q_4	q_3
(q_3)	q_5	q_6
(q_4)	q_7	q_6
q_5	q_3	q_6
q_6	q_6	q_6
q_7	q_4	q_6

Q7. Derive the regular expression of given automaton using Arden's Theorem.



Part – C **[Marks: 12 each]**

Q8. Describe and highlight the points that differentiate a mealy machine from a moore machine.Illustrate using an example, the conversion of moore machine to mealy machine.

OR

Discuss in detail the procedure to convert context free grammar into Greibach Normal Form. Also apply the discussed procedure to convert the following CFG into GNF

$$s \rightarrow AB, \quad A \rightarrow BS|b, \quad B \rightarrow SA|a$$

Q9. What is the difference between PDA acceptance by empty stack and final state? Design a PDA to accept the language $L = \{\omega 2\omega|\omega\varepsilon\{0,1\}^*\}$ by final state.

OR

Design a Turing machine M to recognize the language$\{1^n2^n3^n|n \geq 1\}$.Obtain the computation sequence of M for processing the input string 112233.

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Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

10 JUN 2023

[Total No. of Questions: 09] [Total No. of Pages: 2]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th Sem
Name of Subject: Theory of Computation
Subject Code: PCIT-112
Paper ID: 16443
Scientific calculator is NotAllowed

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Comment on TOC in area of computer science.

b) List the basic Symbols used in formal language.

c) Compare Moore and meally machines example.

d) List the Closure properties of language classes.

e) Construct a Finite Automata for the regular expression ((a+b)(a+b))*.

f) If L is a language accepted by a nondeterministic finite automation, then a deterministric finite automation exists accepting L. Discuss.

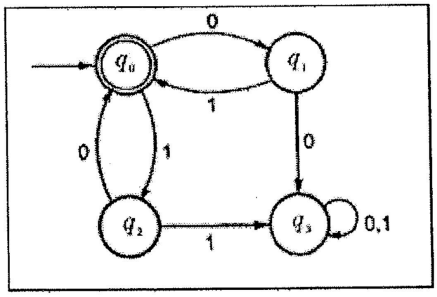
Part – B **[Marks: 04 each]**

Q2. Define finite state machine in TOC? Construct Finite State Machine as Processing input.

Q3. Compare Kleen Closure and Kleen Positive with suitable example.

Q4. Define Halting Problem. Comment on ATM ={(M,w) | M is a TM and M halts at input w }.

Q5. Construct RE for given finite automata with Arden's theorem.



P.T.O.

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

Q6. Construct NFA and convert it to it's equivalent DFA for the regular expression $1(1+10)^* + 10(0+01)^*$

Q7. Construct a grammar in Greibach Normal Form equivalent to grammar

S -> AA | a

A -> SS | b

Part – C **[Marks: 12 each]**

Q8. Design a Turing machine to add two given integers. Construct Turing machine for L $= \{a^n b^m a^{(n+m)} \mid n,m \geq 1\}$

OR

Construct Pushdown automata for $L = \{0^m 1^{(n+m)} 2^n \mid m,n \geq 0\}$

Q9. Compare linear bounded automata and context sensitive language.

OR

a) Explain Pumping Lemmas and its types.

b) Discuss Chomsky Classification of Grammars.

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Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

14 DEC 2023

[Total No. of Questions: 09] [Total No. of Pages: 2.]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Theory of Computation
Subject Code: PCIT-112
Paper ID: 16443

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Can you recall the different types of alphabets used in formal languages?
b) Explain Chomsky's classification of languages and its significance.
c) Compare and contrast the closure properties of different language classes.
d) How are languages related in terms of inclusion and equality? Give examples to illustrate these relationships.
e) Define the concept of acceptance by a Finite Automaton.
f) State the pumping lemma for regular languages.

Part – B **[Marks: 04 each]**

Q2. Compare and contrast Moore and Mealy machines in terms of their structure and functionality.

Q3. Design a Finite Automaton that recognizes a specific language described in words. Explain Arden's theorem in the context of regular grammars.

Q4. Create a regular grammar for a language that accepts all strings over the alphabet {0, 1} that end with '01'. Convert the regular expression (0+1)* into an equivalent finite automaton.

Q5. Construct a finite automaton for a language that accepts strings with alternating '0's and '1's.

EVENING

14 DEC 2023

Q6. Demonstrate the equivalence between DFA and NDFA for a specific language.

Q7. Evaluate the limitations of Turing Machines in solving certain types of problems and discuss potential alternatives.

Part – C **[Marks: 12 each]**

Q8. Explain the Pumping Lemma and its significance in the theory of context-free languages. Develop a formal language that cannot be expressed by regular grammar and explain why.

OR

Provide an example of a language that can be accepted by a Pushdown Automaton. Evaluate the statement: "Pushdown Automata can recognize more languages than Finite Automata." Is this true or false?

Q9. a) Create a set of closure properties for a novel language class and discuss its potential applications. Explain the concept of closure properties in the context of formal languages.

b) Break down the steps involved in solving the Halting problem and explain the challenges associated with it.

OR

a) Critically evaluate the limitations of context-sensitive languages in terms of computational efficiency and practical implementation. How do these limitations impact the broader field of formal languages and automata theory?

b) Propose a theoretical scenario where the Post Correspondence Problem can be utilized in a real-world application.

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Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

MORNING

[Total No. of Questions: 09] 27 FEB 2024 [Total No. of Pages: 02]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Theory of Computation
Subject Code: PCIT-112
Paper ID: 16443
Scientific calculator is not Allowed

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Distinguish Kleen Star and Kleen Positive with suitable example.
b) Is NDPDA more powerful than DPDA? Justify.
c) Design a DFA for |w| mod 4=2 over alphabet set {a, b}
d) Elaborate Sentential form.
e) Articulate grammar for set of all strings starting and ending with different symbol over alphabet set {a, b}.
f) Discuss Multi-tape Turing Machine.

Part – B **[Marks: 04 each]**

Q2. Differentiate Moore and Mealy Machines.

Q3. Describe Chomsky Classification of Languages in detail.

Q4. Design a PDA for odd number of palindromes.

Q5. State Pumping Lemma for regular languages. Show that L= {a^p |where p is prime} is not regular.

Q6. Compare and Contrast Push Down Automata with Turing Machine.

MORNING

27 FEB 2024

Q7. Design model of Finite Automata with suitable diagram

Part – C **[Marks: 12 each]**

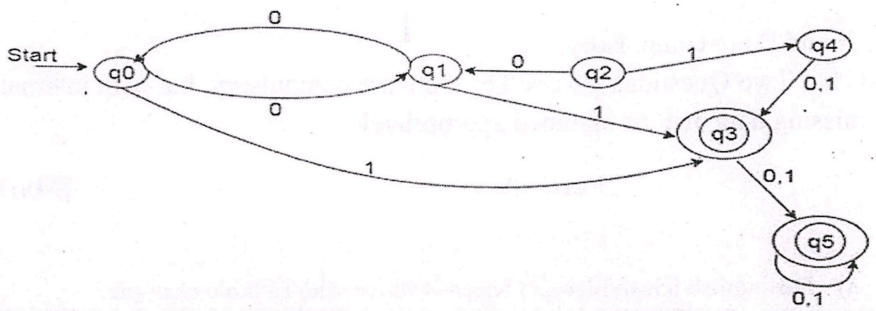
Q8. Formulate a grammar in Greibach Normal Form equivalent to grammar:

S -> AA | a

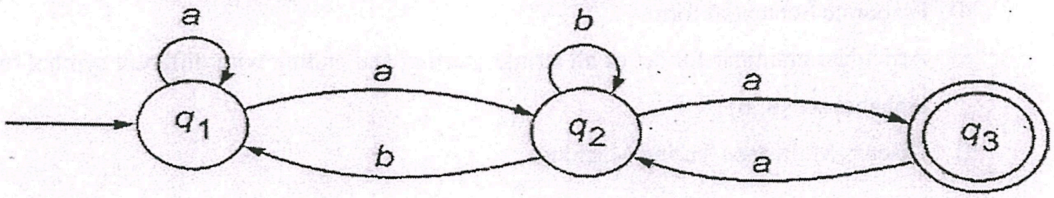
A -> SS | b

OR

Illustrate the need for minimization of automata and minimize the following Finite Automata:



Q9. Construct a regular expression corresponding to the automata given using Arden's Theorem:



OR

Explain Post Correspondence Problem of Turing Machine.

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Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

[Total No. of Questions: 09]
Uni. Roll No. .....

0 5 JUN 2024

[Total No. of Pages: 02]

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Theory of Computation
Subject Code: PCIT-112
Paper ID: 16443
Scientific calculator is not Allowed

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

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2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A [Marks: 02 each]

Q1.

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b) Is NDPDA more powerful than DPDA? Justify.
c) Design a DFA for |w| mod 4=2 over alphabet set {a, b}
d) Elaborate Sentential form.
e) Articulate grammar for set of all strings starting and ending with different symbol over alphabet set {a, b}.
f) Discuss Multi-tape Turing Machine.

Part – B [Marks: 04 each]

Q2. Differentiate Moore and Mealy Machines.

Q3. Describe Chomsky Classification of Languages in detail.

Q4. Design a PDA for odd number of palindromes.

Q5. State Pumping Lemma for regular languages. Show that L= {a^p |where p is prime} is not regular.

Q6. Compare and Contrast Push Down Automata with Turing Machine.

P.T.O.

EVENING

05 JUN 2024

Q7. Design model of Finite Automata with suitable diagram

Part – C **[Marks: 12 each]**

Q8. Formulate a grammar in Greibach Normal Form equivalent to grammar:

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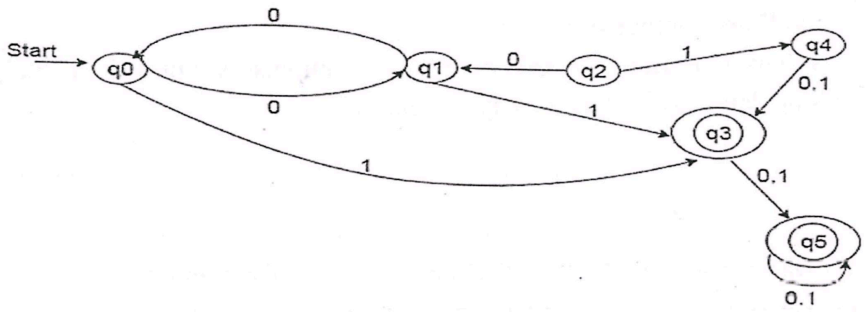
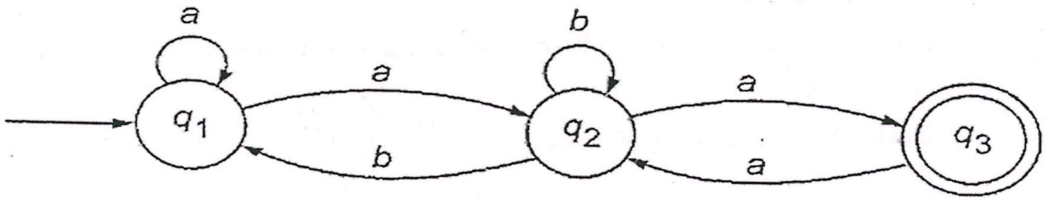
A -> SS | b

OR

Illustrate the need for minimization of automata and minimize the following Finite Automata:



Q9. Construct a regular expression corresponding to the automata given using Arden's Theorem:



OR

Explain Post Correspondence Problem of Turing Machine.

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