KS103 Block-3 5/12/24

Dr. Vishwanath Karad
MIT-WPU | MIT WORLD PEACE UNIVERSITY | PUNE

PRN: 1032210491

SY AIDS

Term End Examination

Nov/Dec 2024

CET2008B - Theory of Computation

Question Paper ID: 047335

Faculty/School	School of Computer Science and Engineering	**Term**	Semester IV
Program	SY B.Tech CSE-AIDS	**Duration**	1 hour 30 minutes
Specialization	-	**Max. Marks**	40

Section - 1 (8 X 5 Marks)
Answer any 8 questions

1	Construct NFA with ∈ and then convert it to NFA(without ∈ moves) for the following regular expression r = 01*0	5 marks	CO1	Understanding
2	Is the given language L is regular? Justify using Pumping Lemma where L= {0^p1^p | p>=1}	5 marks	CO1, CO2	Analysing
3	Explain Chomsky Hierarchy with appropriate examples and diagram.	5 marks	CO3	Remembering
4	Give formal definition of PDA. Consider the CFG with the productions S → a | Sa | bSS | SSb | SbS. Identify if the given grammar is ambiguous or not.	5 marks	CO3	Analysing
5	Convert the following grammar to Chomsky Normal Form (CNF) S→1A | 0B A→1AA | 0S | 0 B→0BB | 1S | 1	5 marks	CO3	Analysing
6	Construct a PDA for the CFG SàaBB BàaS | bS | a Test whether aba^4 is in N(A).	5 marks	CO3	Analysing
7	Design a Turing Machine that performs the addition of two unary numbers. Show the simulation of a strings111 and 11 using ID.	5 marks	CO4	Analysing
8	Explain the Universal Turing Machine with a neat diagram.	5 marks	CO4	Remembering
9	What is undecidability? Explain the Post-Correspondence Problem(PCP) with a proper example.	5 marks	CO5	Understanding

repeat

10	Explain Recursive and Recursively enumerable languages with proper examples and diagrams. - Unit 5	**5 marks**	CO5	Understanding

END OF QUESTION PAPER

B.IK-28 (15)

30/5/24

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Term End Examination

May/June 2024

CET2008B - Theory of Computation

Question Paper ID: 037730

Faculty/School	School of Computer Science and Engineering	**Term**	Semester IV
Program	SY B.Tech CSE-AIDS	**Duration**	1 Hours 30 Minutes
Specialization	-	**Max. Marks**	40

Section - 1 (8 X 5 Marks)
Answer any 8 questions

10

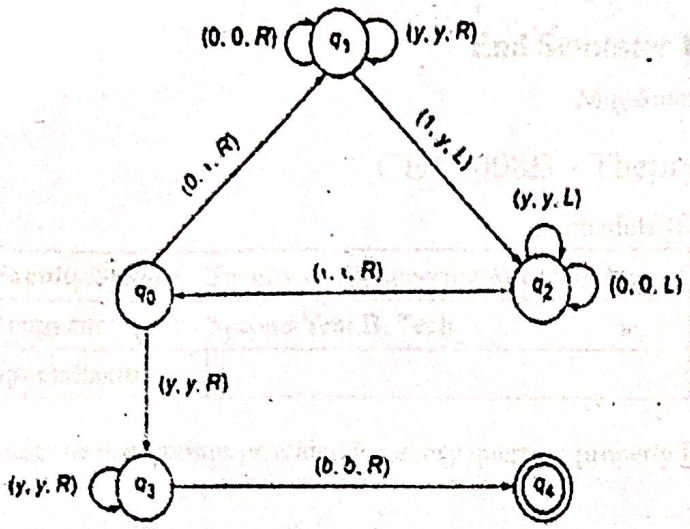
1	Give formal definition of ∈-NFA. Construct DFA for the language over alphabet {a,b} which accepts the strings without substring 'aa'.	5 marks	CO1	Remembering
2	Is the following language regular? Justify using Pumping Lemma where L= $\{0^p1^p \mid p>=1\}$	5 marks	CO1, CO2	Applying
3	Identify the CFG that generates the following languages: a. Set of odd length strings in {a,b}* having 'a' as the middle symbol. b. Set of even length strings in {a,b}*	5 marks	CO3	Analysing
4	Construct a PDA for the following CFG: S→ aBB B→ aS | bS |a Test whether aba^4 is in N(A).	5 marks	CO3	Evaluating
5	Simplify the following grammar, and convert it to Chomsky Normal Form (CNF). S→ ABaC A→ BC B→ b | ∈ C→ D | ∈ D→ C	5 marks	CO3	Analysing
6	Explain complexity of Turing Machine and Multi-Tape Turing Machine	5 marks	CO4	Remembering
7	Design a Turing Machine to find 2's complement of a binary number	5 marks	CO4	Analysing

unit 4 same question

unit 5

unit 5

unit 5 Imp questions

8	Identify the language accepted by the following Turing machine. With Instantaneous description show derivation of the string 0001111.  	**5 marks**	CO4	Remembering
9	Compare P and NP classes with appropriate examples	**5 marks**	CO5	Applying
10	What is undecidability? Explain the Post-Correspondence Problem(PCP) with a proper example.	**5 marks**	CO5	Remembering

END OF QUESTION PAPER

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End Semester Examination

May-June 2023

CET2008B - Theory of Computation

Schedule ID: 19543

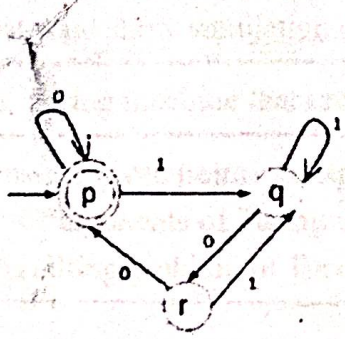
Faculty/School	Faculty of Engineering & Technology	**Term**	IV
Program	Second Year B. Tech	**Duration**	1 Hours 30 Minutes
Specialization		**Max. Marks**	40

Read the instructions provided for every question properly before attempting the answer.

Section - 1 : contain(s) **10** question(s) and each question carries **5** mark(s). You can answer any **8** questions out of **10.**

Click **Finish** only after completion of the Exam.

Section - 1 (8 X 5 Marks)
Answer any 8 questions

1	Construct an NFA to recognize a string that contains a substring 'abb'. List the applications of finite automata. UNIT 1 · pg 77	5 marks	CO1	Applying
2	Apply the Arden theorem to discover the regular expression for the given finite automata. Unit 2 p-26;  Unit 3 pg 32	5 marks	CO2	Applying
3	Explain Chomsky Hierarchy with neat diagram and example.	5 marks	CO3	Remembering

Repeat

5	Check whether or not the following grammar is ambiguous. If it is ambiguous, remove the ambiguity and write an equivalent unambiguous Grammar. unit-3 E-->E+E E-->E*E E-->(E) E-->a	5 marks	CO3	U
6	Construct Push down Automata for given CFG. S → aSa / bSb / x — unit-4 Evaluate designed PDA for String " abaxaba" according to language specification using instantaneous description. unit-4	5 marks	CO4	
7	Make use of following points to compare Finite Automata and Pushdown Automata 1. Formal Definition 2. Transition Function 3. Example 4. Types of Grammar Recognized	5 marks	CO4	I
8	Construct PDA for Language $L = \{a^n b^{2n} \mid n>=0\}$. → unit 4. Evaluate and show simulation of string "aabbbb".	5 marks	CO4	
9	Design Turing machine that recognizes binary palindromes.	5 marks	CO4	
10	Make use of given points to explain Turing machine. 1. Components of Turing machine → unit 5 2. Halting problem of Turing Machine → unit 5	5 marks	CO4	I

END OF QUESTION PAPER

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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

PRN:

Term End Examination

Dec 2023

CET2008B - Theory of Computation

Question Paper ID: 029239

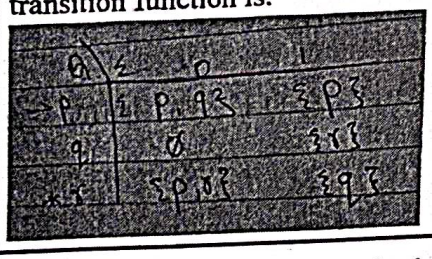
Faculty/School	Engineering and Technology	**Term**	Sem-IV
Program	SY BTech CSE AIDS	**Duration**	**1 Hours 30 Minutes**
Specialization		**Max. Marks**	**40**

Read the instructions provided for every question properly before attempting the answer.

Section - 1 : contain(s) **10** question(s) and each question carries **5** mark(s).You can answer any **8** questions out of **10.**

Click **Finish** only after completion of the Exam.

Section - 1 (8 X 5 Marks)
Answer any 8 questions

1	Convert the following NFA to DFA where Q= {p, q, r}, E = {0,1}, q0={p}, F = { r } transition function is. 	**5 marks**	CO1	Applying
2	List closure properties of regular languages. Identify regular expression r for the regular language: L(r) ={00,010,0110,01110,.....}	**5 marks**	CO1	Remembering
3	Show the leftmost and rightmost derivation for the string "001100" by considering the grammar G= {(S, A), (0,1), P, S} where P consists of: S-->0AS | 0 A-->S1A | SS | 1. State whether Grammar is ambiguous or not.	**5 marks**	CO2	Applying
4	Identify the CFG that generates following regular expressions: 1. a*b* 2. (baa+ abb) *	**5 marks**	CO2	Understandin

5	Construct a PDA that accepts the following language. $L = \{a^n b^m c^n \mid n,m>=0\}$ by an empty stack.	**5 marks**	C
6	What are types of PDA? Write the formal definition of a PDA. List any 4 applications of a CFG?	**5 marks**	C
7	Construct a pushdown automata for the CFG. S-->0BB B-->0S | 1S |0 Test whether 010000 is accepted or not.	**5 marks**	C
8	Design a Turing Machine to find the 1's complement of any binary number ? Write instantaneous description (ID) for string 01010111.	**5 marks**	C
9	Make use of given points to explain Turing machine 1. Components of Turing machine 2. Halting problem of Turing Machine	**5 marks**	C
10	Explain Recursive Languages and Recursively Enumerable Languages with examples.	**5 marks**	C C

END OF QUESTION PAPER

NOT LIMITED TOOOOO.....

Construct a DFA accepting all strings w over {0,1} such that the number of 1's in w is 3 mod 4.

Write any 10 Identities of regular expressions.

Define DFA and NFA

Explain with an example NFA to DFA Conversion Method

If $L(r)$ = {aaa, aab, aba, abb, baa, bab, bba, bbb}. Find the regular expression r which represents $L(r)$ and construct a corresponding DFA for the obtained regular expression.

Convert the Grammar
S-> asb,|A and
A->bSa|S|epsilon
to a PDA that accepts the same language by empty stack.

Elaborate the formal definition of PDA and Design PDA for the language
L= { $a^m b^n a^m$ | n,m>=1}

Illustrate the elements of Turing machine and explain variants of Turing Machine – Composite TM, Multi tape TM, Iterative TM

Convert the following NFA to DFA by adding all possible subsets of the set of states. p is the initial state and q is the final state.

	0	1
p	{p,q}	{q}
*q	{r}	{r}
r	φ	{r}

Explain any 3 closure properties of regular languages with suitable examples.

Explain Time complexity of deterministic and nondeterministic TM in detail.

Construct NFA to recognize language containing strings such that the third symbol from the right end is a 1 over {0,1}.

Construct the NFA accepting languages represented by 0^*1^*2^* and convert it into DFA .

Design a Mealy machine for a binary input sequence such that if it has a substring 110 the machine outputs A , if it has a substring 101 machine outputs B , otherwise outputs C .

Consider the following grammar

$S \rightarrow aAS \mid a$

$A \rightarrow SbA \mid SS \mid ba$

Derive the string aabbaa using

1. Leftmost Derivation
2. Rightmost Derivation

Construct the grammar for following languages when input symbols are {a,b } .

1. Palindrome for the odd length .
2. Palindrome for Even length , where length is always greater than zero .

Convert the following grammar in CNF .

$A \rightarrow 01XY$

$X \rightarrow 1XY \mid \epsilon$

$Y \rightarrow YXa \mid X \mid \epsilon$

What is decidability and undecidability?Explain with examples.

Halting problem is undecidable.Prove

What are recursive and recursively enumerable languages?Give examples.

Write a short note on Post correspondence problems.

Define the tuple of DFA & Draw the DFA for all strings end with abb where input symbol {a,b}

Construct the PDA for L= { a^n b^n c^md^m | N,M >=1 } .

Explain the following terms in relation with Turing Machine.

1) Solvability 2) Semi-solvability 3) Unsolvability.

Construct a Turing Machine for finding 2's complement of a binary number.

Design a Turing machine over {1, b} which can compute a concatenation function over $\Sigma = \{1\}$. If a pair of words (w1, w2) is the input the output has

to be w1w2.

Describe the Instantaneous Description of Turing Machine and also state the acceptance and rejection conditions for the Turing Machine

Design a Turing Machine which recognizes palindromes over the alphabet {a,b}.

5 Design Turing Machine that checks if a set of parentheses are well-formed and shows the acceptance of W. use Instantaneous Description: w= (( )).

5 Design a Turing machine over {1, b} which can compute a concatenation function over Σ = {1}. If a pair of words (w1, w2) is the input the output has to be w1w2.

5 Write short notes on

a) Composite TM.

b) Halting problem of TM.

c) Church Turing hypothesis.

5. Design a Turing Machine that replaces every occurrence of abb by baa.

NOT LIMITED TOOOOO.....

MIT-WPU

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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

[redacted]

30/11/24

PRN:

Term End Examination

Nov/Dec 2024

CET2008B - Theory of Computation

Question Paper ID: 046856

Faculty/School	School of Computer Science and Engineering	**Term**	Semester VI
Program	TY B.Tech CSE/CSF	**Duration**	**1 hour 30 minutes**
Specialization	-	**Max. Marks**	**40**

Section - 1 (8 X 5 Marks)
Answer any 8 questions

1	Explain any three closure properties of regular languages with suitable examples.	**5 marks**	CO1	Remembering
2	Design a Melay machine for a binary input sequence such that if it has a substring 110 the machine outputs A, if it has a substring 101 machine outputs B, otherwise outputs C.	**5 marks**	CO1	Applying
3	Consider the following grammar S--> aAS | a A--> SbA | SS | ba Derive the string 'aabbaa' using and also draw derivation trees : 1.Leftmost Derivation 2.Rightmost Derivation	**5 marks**	CO2	Understanding
4	Convert the following grammar in Chomsky normal form(CNF) A --> 01XY X --> 1XY | ϵ Y --> YXa | X | ϵ	**5 marks**	CO2	Applying
5	Construct the Pushdown Automata (PDA) for the language L = { $a^nb^nc^md^m$ | n,m >=1 }	**5 marks**	CO3	Applying
6	Design Turing Machine which recognises palindromes over the alphabet {a,b}.	**5 marks**	CO4	Applying
7	Design Turing Machine that checks if a set of parentheses are well-formed and shows the acceptance of W where W = (( )) .	**5 marks**	CO4	Applying

130

8	Design a Turing Machine over {1,b} which can compute a concatenation function over Σ = { 1 } .If a pair of words (w1,w2} is the input ,the output has to be w1w2.	**5 marks**	CO4	Applying
9	Explain the complexity of deterministic and non-deterministic Turing Machine in detail.	**5 marks**	CO5	Analysing
10	What is the decidability and undecidability ? Halting problem is undecidable.Prove.	**5 marks**	CO5	Remembering

END OF QUESTION PAPER

29/5/24

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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

PRN: [redacted]

Term End Examination

May/June 2024

CET2008B - Theory of Computation

Question Paper ID: 037666

Faculty/School	School of Computer Science and Engineering	**Term**	Semester VI
Program	TY B.Tech CSE/CSF	**Duration**	**1 Hours 30 Minutes**
Specialization	-	**Max. Marks**	**40**

Section - 1 (8 X 5 Marks)
Answer any 8 questions

1	**Construct the NFA accepting languages represented by 0*1*2* and convert it into DFA .**	**5 marks**	CO1	Applying
2	**Write any 10 Identities of regular expressions.**	**5 marks**	CO2	Understanding
3	**Construct the grammar for following languages when input symbols are {a,b } .** **1. Palindrome for the odd length .** **2. Palindrome for Even length , where length is always greater than zero .**	**5 marks**	CO3	Applying
4	**Convert the following grammar in CNF .** **A → 01XY** **X → 1XY | ϵ** **Y →YXa | X | ϵ**	**5 marks**	CO3	Remembering
5	**Construct the PDA for L= { a^n b^n c^md^m |N,M>=1 } .**	**5 marks**	CO3	Applying
6	**Design a Turing machine over {1, b} which can compute a concatenation function over Σ = {1}. If a pair of words (w1, w2) is the input the output has to be w1w2.**	**5 marks**	CO4	Applying
7	**Describe the Instantaneous Description of Turing Machine and also state the acceptance and rejection conditions for the Turing Machine**	**5 marks**	CO4	Applying

8	What is decidability and undecidability? Explain with examples.	5 marks	CO5	Understanding
9	Design a Turing Machine that replaces every occurrence of abb by baa.	5 marks	CO4	Applying
10	What are recursive and recursively enumerable languages? Give examples.	5 marks	CO5	Understanding

END OF QUESTION PAPER