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10CS56

Fifth Semester B.E. Degree Examination, June/July 2015
Formal Languages and Automata Theory

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Design a DFA to read strings mode up of letters "CHARIOT" and recognize these strings that contains the word "CAT" as a substring. **(08 Marks)**

b. Draw DFA to accept the language L = {ω : ω has add number of 1's and followed by even number of 0's. Completely define DFA and transition function. **(06 Marks)**

c. Convert the following NFA to its equivalent DFA. **(06 Marks)**

2 a. Prove that if L = L(A) for some DFA, then there is a regular expression R such that L = L(R). **(06 Marks)**

b. For the following DFA, obtain regular expressions $R_{ij}^{(0)}$ and $R_{ij}^{(1)}$. **(09 Marks)**

States	Σ: 0	Σ: 1
$\rightarrow q_1$	q_2	q_1
q_2	q_3	q_1
q_3	q_3	q_2

c. Construct NFA for regular expression $V = (01 + 10)^+$. **(05 Marks)**

3 a. State and prove pumping Lemma for regular languages. **(05 Marks)**

b. Show that $L = \{A^{n!} \mid u \geq 0\}$ is not regular. **(05 Marks)**

c. Construct 0 minimum automation equivalent to given automation 'M' whose transition table given below :

States	input: 0	input: 1
$\rightarrow q_0$	q_0	q_3
q_1	q_2	q_5
q_2	q_3	q_4
q_3	q_0	q_5
q_4	q_0	q_6
q_5	q_1	q_4
q_6 *	q_1	q_3

(10 Marks)

4 a. What is a grammer? Explain the classification of grammers with examples. **(07 Marks)**

b. Obtain the grammer to generate the following languages :

i) $L = \{\omega : n_a(\omega) \bmod 2 = 0 \text{ where } \omega \in (a, b)^*\}$

ii) $L = \{\omega : \omega \text{ is a palindrome, where } \omega \in (a, b)^*\}$

iii) $L = a^n b^{2n} \mid u \geq 1$. **(06 Marks)**

c. Show that the following grammer is ambiguous :

$S \rightarrow a \mid Sa \mid bSS \mid SSb \mid SbS$. **(07 Marks)**

PART – B

5 a. Construct PDA for the language and simulate this PDA (10 Marks)
$L = \{a^i b^j c^k \mid j = i + k, i, k \geq 0$.
b. Define PDA. Explain the language accepted by PDA. (05 Marks)
c. Explain the PDA with two stocks. (05 Marks)

6 a. Simplify the grammer by eliminating useless productions.
S AB
$A \rightarrow a$
$B \rightarrow C \mid b$
$C \rightarrow D$
$D \rightarrow E \mid bC$
$E \rightarrow d \mid Ab$. (06 Marks)
b. Convert the following CFG to CNF.
$S \rightarrow aB \mid bA$
$A \rightarrow a \mid aS \mid bAA$
$B \rightarrow b \mid aS \mid aBB$. (06 Marks)
c. Prove that context free languages are closed under union, concatenation and star. (08 Marks)

7 a. Explain the programming techniques for turing machine. (10 Marks)
b. Construct a TM for $L = \{a^u b^u c^u \mid u \geq 1\}$. Give the graphical representation for the obtained TM. (10 Marks)

8 Explain the following :
a. Post correspondence problem
b. Recursively enumerable language
c. Recursive languages
d. Universal languages. (20 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2013
Formal Languages and Automata Theory

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain the working of finite automata with a neat diagram. **(04 Marks)**
b. Define a DFA and NFA. **(06 Marks)**
c. Design a finite automata which accepts odd number of 0's and odd number of 1's and verify your answer. **(10 Marks)**

2 a. Define a regular expression, prove that for every regular expression, there exists a finite automata which accepts same language accepted by the regular expression. **(10 Marks)**
b. Write a note on applications of regular expressions. **(04 Marks)**
c. Give regular expressions for the following languages:
i) $L = \{W/W \text{ is in } \{a, b\}^* \text{ and } |w| \bmod 3 = 0\}$
ii) $L = \{W/W$ is a string of a's and b's ending with aab$\}$. **(06 Marks)**

3 a. Prove that regular languages are closed under union, complementation and intersection operations. **(08 Marks)**
b. State and prove pumping lemma of regular languages. **(08 Marks)**
c. Prove that the language $\{a^n b^n : n \geq 1\}$ is not regular. **(04 Marks)**

4 a. Define a context free grammar. Design a context free grammar for the languages
i) $L = \{W a^n b^n W^R : W \text{ is in } \{a, b\}^*\}$
ii) $L = (a^{2n} b^n : n \geq 1\}$. **(12 Marks)**
b. Define the following terms:
i) Derivation tree
ii) Parsing
iii) Inherently ambiguous grammar
iv) Left most and right most derivations. **(08 Marks)**

PART – B

5 a. Explain the working of a PDA with a neat diagram. Which data structure helps a PDA to accept a context free language? **(06 Marks)**
b. Design a PDA for all strings of a's and b's with equal number of a's and b's. **(08 Marks)**
c. How can we construct a PDA for a given grammar? Explain the steps. **(06 Marks)**

6 a. Define Chomsky normal form. Why normalization is essential for grammars? (06 Mark

b. Define the following and show how these can be eliminated in a grammar:
   i) Useless
   ii) Null
   iii) Unit productions. (06 Mark

c. Convert the following CFG to CNF. S is the start symbol.
$S \rightarrow BC$, $B \rightarrow AB/\epsilon$, $A \rightarrow 011/1$ $C \rightarrow DC/\epsilon$ $D \rightarrow 01$. (08 Mark

7 a. Define a Turing machine. Explain the working of a TM. How it differs from FA? (10 Mark

b. Design a TM to accept a language which has number of b's equal to twice the number of a' (10 Mark

8 a. Show that a multi-track TM is equivalent to a basic TM. (08 Mark

b. Write a detailed note on halting problem of Turing machine. (06 Mark

c. Write a note on universal Turing machine with an example. (06 Mark

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16CS/IS52

Fifth Semester B.E. Makeup Examination, January 2020
FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours **Max. Marks: 100**

Instructions: 1. Answer ANY FIVE full questions from Each UNIT
2. Assume any missing data

UNIT - I

L CO PO M

1 a. What is Automata? With Neat schematic representation explain the working of Automata? **(01) (01) (01) (08)**

b. Construct DFA for the following Languages

i. Set of all strings over $\Sigma=\{0,1\}$ starting with substring 01

ii. Set of all strings over $\Sigma=\{0,1\}$ ending with substring 011

iii. $L=\{\ |w| \bmod 3 <> 0,$ where $w \in \Sigma^*$ for $\sum=\{a, b\}\ \}$

iv. $L=\{\ |w| \bmod 3 \geq |w| \bmod 2,$ where $w \in \Sigma^*$ for $\sum=\{a, b\}\ \}$

(03) (01) (03) (12)

OR

2 a. Define ε-NFA and Construct the ε-NFA with four states for the following Language and Compute $\delta^*(q0, aabba)$

$L=\{a^n \mid n>=0\} \cup \{b^n a \mid n>=1\}$

(03) (01) (02) (08)

b. Apply Subset Construction Scheme by lazy evaluation and Convert the following ε-NFA into an equivalent DFA

δ	ε	a	b	c
→p	Φ	{p}	{q}	{r}
q	{p}	{q}	{r}	Φ
*r	{q}	{r}	Φ	{p}

(03) (01) (12) (12)

UNIT – II

L CO PO M

3 a. Define Regular expression and build the Regular expression for the following languages

i. To accept a language consisting of strings of a's and b's of odd length.

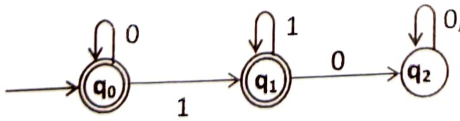
ii. To accept a language consisting of strings of 0's and 1's that do not end with 01.

iii. $L=\{vuv \mid u, v \in \Sigma^*$ for $\sum=\{a, b\}$ and $|v|=2\}$

iv. $L=\{\ |w| \bmod 3 = |w| \bmod 2,$ where $w \in \Sigma^*$ for $\sum=\{a, b\}\ \}$

(03) (02) (03) (10)

b. Apply State elimination method to identify the Regular Expression for the following finite Automata



(03) (02) (02) (10)

OR

4 a. State and prove the Pumping Lemma for Regular Languages. Apply Pumping Lemma and discover that the following language is Non-Regular

$L=\{0^n \mid n$ is perfect Square$\}$

(03) (03) (12) (10)

b. Apply Table Filling Algorithm and Determine the Minimum State
Automata(DFA) for the following DFA shown in the Fig 4

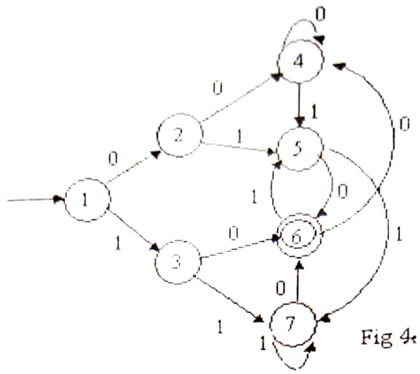


Fig 4

L	CO	PO	M
(05)	(03)	(03)	(10)

UNIT – III

5 a. Obtain a context free grammar to generate a language consisting of equal number of a's and b's. (2) (3) (1) (05)

b. Consider the context free grammar with productions.

E→I E→E+E
E→E*E E→(E)
I→a I→b
I→Ia I→Ib
I→I0 I→I1

Write leftmost derivation and parse tree for the string (a101+b1)*(a1+b). (4) (3) (1) (10)

c. Eliminate Useless symbols in the grammar.

S → aA | bB
A → aA | a
B → bB
D → ab | Ea
E → aC | d

(2) (3) (1) ( )

OR

6 a. Show that the following grammar is ambiguous.

S→ aB|bA
A→ aS|bAA|a
B→ bS|aBB|b

(2) (3) (1) (08)

b. Eliminate Useless symbols in the grammar.

S → aA| a |Bb | cC
A → aB

(2) (3) (1) (04)

c. Eliminate all ϵ-productions from the grammar.

S→ ABCa|bD
A→ BC|b
B→ b| ϵ
C→c | ϵ
D→ d

(2) (3) (1) (08)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

UNIT – IV

			L	CO	PO	M
7	a.	Define Push Down Automata- PDA and Construct PDA for the following language by final state. Draw Transition Diagram and write the sequence of Instantaneous Description – ID's to trace the input string for n = 2. $$L = \{a^n b^{2n} \mid a, b \in \Sigma, n \geq 0\}$$	(03)	(04)	(03)	(10)
	b.	Define language acceptance of PDA and Construct PDA by empty stack for the following Grammar and write the sequence of Instantaneous Description – ID's to trace the input string – w = aaaaaa $$S \rightarrow aAS \mid bAB \mid aB$$ $$A \rightarrow bBB \mid aS \mid a$$ $$B \rightarrow bA \mid a$$	(03)	(04)	(03)	(10)

OR

8	a.	Define Turing machine and With neat schematic diagram explain the working of Basic Turing machine.	(02)	(04)	(02)	(10)
	b.	Construct Turing Machine to accept the following language and write the sequence of Instantaneous Description – ID's to trace the input string w = " aabb" $$L = \{a^n b^n \mid a, b \in \Sigma, n \geq 0\}$$	(03)	(04)	(03)	(10)

UNIT -V

			L	CO	PO	M
9	a.	Explain the structure of LEX specification format with suitable example	(02)	(05)	(01)	(10)
	b.	Develop a LEX program to count the number of identifiers, integer and floating point constants present in the input stream..	(03)	(05)	(03)	(10)

OR

10	a.	Explain the structure of YACC specification format with suitable example	(02)	(05)	(01)	(10)
	b.	Develop a YACC program to recognize and evaluate the arithmetic expression involving additive operators (+, -) and multiplicative operators (*, /).	(03)	(05)	(03)	(10)

16CS/IS52/15IS52

Fifth Semester B.E. Semester End Examination, Dec./Jan. 2019-20

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Answer any one full question from each UNIT.*
2. *Each full question of a UNIT carries 20 marks*

UNIT - I

			L	CO	PO	M
1	a.	Define the following with an example for each. (i). Alphabet (ii). Strings (iii).Power of an alphabet (iv).Transition table (v). Transition diagram	(1)	(1)	(1)	(05)
	b.	Design a DFA to accept the language L={ w | w is of even length and begins with 01}.	(3)	(1)	(3)	(07)
	c.	Design a NFA which accepts strings of 0'and 1's that have the symbol 1 in the second last position. Convert NFA to equivalent DFA.	(3)	(1)	(3)	(08)

OR

			L	CO	PO	M
2	a.	Design a NFA to accept strings of 0's and 1's that have 1 in third last position. Define Epsilon closures with an example.	(3)	(1)	(3)	(07)
	b.	Design a ε-NFA to accept the decimal number consisting of an optional+ or – sign, a string of digits, a decimal point and another string of digits, either this string of digits or string after decimal point can be empty but atleast one of the two strings is nonempty.	(6)	(1)	(3)	(08)
	c.	Design a DFA to accept the language L={awa | w Є (a+b)*}	(3)	(1)	(3)	(05)

UNIT – II

			L	CO	PO	M
3	a.	Prove that, If L=L(A) for some DFA A, then there is a regular expression R such that L=L(R).	(3)	(2)	(1)	(06)
	b.	Convert regular expression (0+1)*1(0+1) to a ε-NFA.	(3)	(2)	(1)	(06)
	c.	Design a NFA which accepts all strings containing 110. Convert it to a regular expression.	(3)	(2)	(1)	(08)

OR

4 a. Minimize the following DFA using table filling algorithm.

δ	0	1
→A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

(6) (2) (1) (10)

b. Show that $L=\{a^n b^n \mid n \geq 0\}$ is not regular. (3) (2) (1) (05)

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. State and Prove Pumping Lemma for regular languages.

(3) (2) (1) (05)

UNIT - III

L	CO	PO	M

5 a. Define Context Free Grammar and Construct Context Free Grammar for the following Languages

i. Set of strings of a's and b's starting with substring 'ab'

ii. $L = \{ a^n b^m c^k \mid n = m + k, \text{ for } k, m >= 0 \}$

(03) (02) (02) (06)

b. The following grammar generates the language of RE - $0^*1(0+1)^*$

$S \rightarrow A \mid B$

$A \rightarrow 0A \mid \varepsilon$

$B \rightarrow 0B \mid 1B \mid \varepsilon$

Determine leftmost, rightmost derivations and Parse Tree for the following strings

a) 00101 b) 1001

(03) (02) (02) (10)

c. Prove that the family of Context free Languages is under UNION.

(05) (03) (12) (04)

OR

6 a. Define Ambiguous Grammar and Prove that the following grammar is ambiguous for string aab

$S \rightarrow aS \mid aSbS \mid \varepsilon$

(05) (02) (12) (06)

b. Simplify the following grammar by removing redundancies.

$S \rightarrow ASB \mid \varepsilon$

$A \rightarrow aAS \mid a$

$B \rightarrow SbS \mid A \mid bb$

(04) (03) (02) (10)

c. Organize the following grammar into an equivalent Grammar in Chomsky Normal Form – CNF

$S \rightarrow Aba \mid AB$

$A \rightarrow aab$

$B \rightarrow b$

(03) (03) (03) (04)

UNIT - IV

L	CO	PO	M

7 a. Design a turing machine to accept the language $L=\{0^n1^n \mid n>=1\}$.

(6) (4) (1) (10)

b. Show that the PDA to accept the language $L(M) = \{w \mid w \in (a+b)^*$ having equal number of a's and b's $\}$ is nondeterministic.

(2) (4) (1) (08)

c. Define deterministic PDA.

(1) (4) (1) (02)

OR

8 a. Design a turing machine to accept the language consisting of all palindromes of 0's and 1's.

(6) (4) (1) (10)

b. Design a PDA to accept the language $L(M) = \{wCw^R \mid w \in (a+b)^*$ where w^R is reverse of w by a final state.

(6) (4) (1) (10)

UNIT -V

L	CO	PO	M

9 a. Explain the structure of lex program with an example.

(2) (5) (3) (07)

b. Write a word counting lex program.

(3) (5) (3) (07)

c. Explain yacc parser with an example.

(2) (5) (1) (06)

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

OR

10 a. Explain shift reduce parsing. (2) (5) (1) (07)

b. What is regular expression? Explain characters that form a regular expression. (2) (5) (1) (08)

c. Write lex specification for decimal numbers. (3) (5) (1) (05)

Fifth Semester B.E. Fast Track Semester End Examination, July/August 2019

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours **Max. Marks: 100**

Instructions: *1. UNIT I & V are Compulsory.*
2. Answer any one full question from remaining each UNITS.

UNIT - I (Compulsory)

			L	CO	PO	M
1	a.	Define the following with examples. i) Alphabet ii) String iii) Language	(1)	(1)	(12)	(05)
	b.	Design DFA for the following: i) To accept the strings of a's and b's ending with 'ab'. ii) L={ w such that |w|mod3=0, w € {a,b}* }	(3)	(1)	(3)	(08)
	c.	Design an NFA to accept the strings of 0's and 1's that end with 10. Convert the same NFA to DFA.	(3)	(1)	(3)	(07)

UNIT – II

			L	CO	PO	M
2	a.	Define regular expression. Write regular expression for following: i) L = { 0^n1^m | (m+n) is even } ii) Strings of 0's and 1's whose 2^{nd} symbol from the end is 0.	(3)	(2)	(2)	(05)
	b.	Show that the language L={ a^nb^n | n >= 1 } is not regular.	(3)	(3)	(1)	(05)
	c.	Minimize the following DFA using table-filling algorithm.	(3)	(2)	(3)	(10)

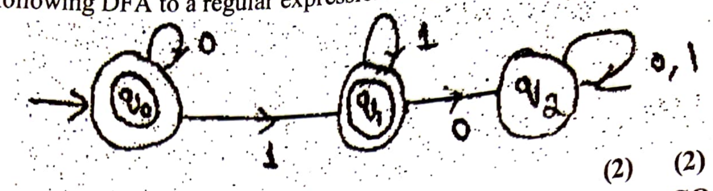
δ	0	1
-->A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

OR

			L	CO	PO	M
3	a.	Write regular expression for the following: i) L = { a^nb^m | n >= 4, m <= 3 } ii) L = { $a^{2n}b^{2m+1}$ | m >= 0, n >= 0 }	(3)	(2)	(2)	(05)
	b.	State and prove pumping lemma for regular languages.	(3)	(3)	(1)	(07)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. Translate the following DFA to a regular expression using state-elimination method.



L	CO	PO	M
(2)	(2)	(1)	(08)

UNIT - III

			L	CO	PO	M
4	a.	Define context-free-grammar(CFG). Construct the CFG for the following languages: i) L= { w | w ϵ (a+b)*ab } ii) L= { a^nb^n | n >=0 }	(3)	(2)	(2)	(06)
	b.	Write LMD, RMD and parse tree for the string '+*-xyxy' using the grammar: E -> +EE | *EE | -EE | x | y	(3)	(2)	(2)	(08)
	c.	Illustrate the applications of CFG.	(2)	(2)	(12)	(06)

OR

			L	CO	PO	M
5	a.	Define ambiguous grammar. Show that the following grammar is ambiguous for the string 'aab'. S -> AB | aaB; A -> a | Aa; B -> b	(2)	(3)	(2)	(05)
	b.	Define CNF. Convert the following grammar into CNF. S --> 0A | 1B; A--> 0AA | 1S | 1; B --> 1BB | 0S | 0	(3)	(3)	(3)	(10)
	c.	Illustrate the applications of CFG.	(2)	(2)	(12)	(05)

UNIT - IV

			L	CO	PO	M
6	a.	Explain the working of PDA with a diagram.	(2)	(4)	(12)	(05)
	b.	Design a PDA for accepting the language L = { ww^R | w is in $(0+1)^*$ }. Draw the transition diagram for PDA obtained. Show the instantaneous description of the PDA for the string '0110'.	(3)	(4)	(3)	(10)
	c.	Define turing machine. Explain with a neat diagram, the working of a basic turing machine.	(2)	(4)	(12)	(05)

OR

			L	CO	PO	M
7	a.	Define a deterministic PDA (DPDA). Design a DPDA along with transition diagram for the language L ={a^nb^{2n} | n>=0}.	(3)	(4)	(3)	(06)
	b.	Design a turing machine to accept the set of all palindromes over $\{a,b\}^*$. Also indicate the moves made by turing machine for the string 'aba'.	(3)	(4)	(3)	(14)

UNIT -V (Compulsory)

			L	CO	PO	M
8	a.	Explain the structure of lex with example.	(2)	(5)	(12)	(06)
	b.	Explain parser-lexer communication.	(2)	(5)	(12)	(06)
	c.	Define regular expression. Explain the various regular expressions in UNIX with example for each.	(2)	(5)	(12)	(08)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

USN | | | | | | | | | |

15CS52/16CS/IS52

Fifth Semester B.E. Makeup Examination, January 2019

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours

Max. Marks: 100

Instructions: 1. UNIT III & V are Compulsory.
2. Answer any one full question from remaining each UNITS.

UNIT - I

L CO PO M

1 a. Rephrase the formal definition of DFA. (1) (1) (2) (04)

b. Design a DFA to accept the language L= {w|w is of the form x01y for some strings x and y consisting of 0's and 1's. **Compute $\hat{\delta}$*(q0, 00001111)** (3) (1) (2) (06)

c. Design an NFA which accepts exactly those strings that have the symbol 1 in the second last position. Convert NFA to equivalent DFA using Subset Construction scheme by lazy evaluation. (4) (1) (2) (10)

OR

2 a. Design a DFA to accept strings of a's and b's except those containing the substring aab (3) (1) (2) (06)

b. Design a ε-NFA to accept the decimal number consisting of an optional + or – sign, a string of digits, a decimal point and another string of digits, either this string of digits or string after decimal point can be empty but atleast one of the two strings is nonempty. (4) (1) (2) (08)

c. Design a DFA to accept the language L={awa | w Є (a+b)*} (4) (1) (2) (06)

UNIT – II

L CO PO M

3 a. Define regular expression. Find regular expression for the following:
i) L = { $a^n b^m$ | (m+n) is even }
ii) Strings of a's and b's whose 4[th] symbol from the end is 'b'.
iii) Strings of 0's and 1's having no two consecutive zeros. (3) (2) (2) (07)

b. Show that the language L={ a^n | n is prime } is not regular. (3) (3) (1) (05)

c. Translate the following DFA to a regular expression using state-elimination method.

δ	0	1
-->*q_0	q_1	q_2
q_1	q_3	q_0
q_2	q_0	q_3
q_3	q_3	q_3

(2) (2) (1) (08)

OR

4 a. State and prove pumping lemma for regular languages. (3) (3) (1) (06)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Minimize the following DFA using table-filling algorithm.

δ	0	1
-->A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

(3) (2) (3) (10)

c. Prove that if L and M are regular languages, then so is L∩M.

(3) (3) (1) (0.

UNIT - III

L	CO	PO	M

5 a. Define Context Free Grammar. Obtain a context free grammar to generate the following language. $L=\{ a^{n-3} b^n \mid n\geq 3 \}$

(3) (3) (2) (06)

b. Consider the context free grammar with productions.

E→I
E→E*E E→E+E
I→a E→(E)
I→Ia I→b
I→I0 I→Ib
  I→I1

Write leftmost derivation and parse tree for the string (a101+b1)*(a1+b).

(4) (3) (2) (07)

c. Define Useless variables and Eliminate Useless variables from the following grammar.

S → aA | bB
A → aA | a
B → bB
D → ab | Ea
E → aC | d

(2) (3) (2) (07)

UNIT - IV

L	CO	PO	M

6 a. Define PDA. Describe the language accepted by PDA.

(2) (4) (12 (05)

b. Design a PDA for the language $L=\{ a^{2n} b^n \mid n>=1 \}$. Draw the transition diagram and also write the sequence of ID's for the string for n=3

(3) (4) (3) (10)

c. Define Turing machine. Explain with a neat diagram, the working of a basic Turing machine.

OR

(2) (4) (12 (05)

7 a. Explain the working of PDA with a diagram.

(2) (4) (12 (06)

b. Design a Turing machine to accept the following language
L= $L=\{ a^n b^n c^n \mid n >=1 \}$.
Also indicate the moves made by turing machine for the string n=2.

UNIT -V

(3) (4) (3) (14)

L	CO	PO	M

8 a. Explain the structure of Lex program with an example.

(2) (5) (3) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Write a word counting Lex program.

c. Explain shift reduce parsing.