

www.FirstRanker.com



**SET - 1** 

#### II B. Tech II Semester Regular Examinations, April - 2018 FORMAL LANGUAGES AND AUTOMATA THEORY (Computer Science and Engineering)

Time: 3 hours

1. a) Define NFA?

Code No: R1622055

Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B) 2. Answer ALL the question in Part-A 3. Answer any FOUR Ouestions from Part-B

### PART –A

(2M)

- b) What is pumping Lemma? (2M) c) For the Grammar  $\{S \rightarrow AS/a, A \rightarrow SbA/SS/ba\}$  construct Left most derivation (3M) for the string aabbaaa? (2M) d) Define Context Free Language? e) (2M) When do you say that a Turing Machine accepts a string? (3M)
- f) Give an example of undecidable problem?

## PART -B

Construct Minimum state Automata for the following DFA? 2. a) (7M) \* .1.

denotes final state				
δ	0	1		
→ q1	q2	q6		
q2	q1 0.0	q3		
*q 3	q2	q4		
q 4	q4	q2		
q5	q4	q5		
*q6	q5	q4		

Differentiate between NFA and DFA? b)

(7M)

- Construct a DFA for the Regular Language consisting of any number of a's 3. a) (7M) and b's
  - b) Explain about the identity rules of Regular Expressions? (7M)
- 4. a) Define Ambiguous Grammar? Check whether the grammar  $S \rightarrow aAB$ , (7M)  $A \rightarrow bC/cd, C \rightarrow cd, B \rightarrow c/d$ Is Ambiguous or not? (7M)
  - b) Obtain GNF S $\rightarrow$ AB, A $\rightarrow$ BS/b, B $\rightarrow$ SA/a?



www.FirstRanker.com

Co	de N	Io: R1622055	<b>R16</b>	SET - 1
5.	a)	Show that for every PDA then there exi	sts a CFG such that L(G)=N(P)?	(7M)

- b) Construct a Turing Machine that will accept the Language consists of all (7M) palindromes of 0's and 1's?
- 6. a) Construct a Turing Machine to recognize the Language { a<sup>n</sup>b<sup>n</sup>c<sup>n</sup>/n>=1 } (7M)
  b) Discuss in brief about Turing reducibility? (7M)
- 7. a) Explain in detail about NP Complete and NP hard problems? (7M)
  b) Define Post Correspondence Problem? Explain in brief about PCP with an (7M)
  - b) Define Post Correspondence Problem? Explain in brief about PCP with an (/M) example?

www.firstRanker.com

2 of 2

www.FirstRanker.com



www.FirstRanker.com

Code No: R1622055



**SET - 2** 

#### II B. Tech II Semester Regular Examinations, April - 2018 FORMAL LANGUAGES AND AUTOMATA THEORY (Computer Science and Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any FOUR Questions from Part-B

•

## PART -A

1.	a)	Draw a NFA which accepts the set of all strings whose second last symbol is 1?	(3M)
	b)	Construct a Finite Automata that accepts $\{0,1\}^+$	(2M)
	c)	Construct a Derivation tree for the string 0011000 $using$ the grammar $S \rightarrow A0S/0/SS$ , $A \rightarrow S1A/10$ ?	(3M)
	d)	Define Push Down Automata?	(2M)
	e)	Give an Example of a Recursive enumerable language?	(2M)
	f)	What is undecidable problem? How it can be solved?	(2M)
		PART -B	
2.	a)	<ul> <li>Design DFA for the following over {a,b}.</li> <li>i) All string containing not more than three a's. ?</li> <li>ii) All strings that has at least two occurrences of b between any two occurrences of a.?</li> </ul>	(7M)
	b)	Construct a DFA accepting the set of all strings ending with 00?	(7M)
3.	a)	Define Regular Expression? Explain about the Properties of Regular Expressions?	(7M)
	b)	Construct a DFA for the Regular expression $(0+1)^*(00+11)(0+1)^*$ ?	(7M)
4.	a)	Define Grammar? Explain about Chomsky Classification of Grammars?	(7M)
	b)	Obtain GNF equivalent to the grammar $E \rightarrow E+T/T$ , $T \rightarrow T^*F/F$ , $F \rightarrow (E)/a$ ?	(7M)
5.	a)	Convert the grammar S $\rightarrow$ 0AA,A $\rightarrow$ 0S/1S/0 to a PDA that Accepts the same Language by Empty Stack?	(7M)
	b)	Construct a PDA for the following grammar $S \rightarrow AA/a$ , $A \rightarrow SA/b$ ?	(7M)
6.	a)	Design a Turing Machine for $L = \{0^n 1^m 0^n 1^m / m, n \ge 1\}$	(7M)
	b)	Explain about types of Turing Machine?	(7M)
7.	a)	Explain about the Decidability and Undecidability Problems?	(7M)
	b)	Discuss in brief about NP Hard problems?	(7M)



www.FirstRanker.com

(R16)

**SET - 3** 

# II B. Tech II Semester Regular Examinations, April - 2018 FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 hours

Code No: R1622055

(Computer Science and Engineering)

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**) 2. Answer **ALL** the question in **Part-A** 3. Answer any **FOUR** Questions from **Part-B** 

## PART -A

1.	a)	Write about the applications of Finite Automata?	(2M)
	b)	If a Regular grammar G is given by $S \rightarrow aS/a$ Find DFA (M) accepting L(G)?	(2M)
	c)	Construct a Left most Derivation for the string 0011000using the grammar $S \rightarrow A0S/0/SS$ , $A \rightarrow S1A/10$ ?	(3M)
	d)	$\{a^{n}b^{n}c^{n}/n \ge 1\}$ is not recognised by PDA. why?	(3M)
	e)	What are the components of a Turing Machine?	(2M)
	f)	Define Post correspondence Problem?	(2M)
		PART -B	
2.	a)	Define Finite Automaton? Explain about the model of Finite Automaton?	(7M)
	b)	Design a NFA for the following language $L=\{0101^n \text{ where } n>0\}$	(7M)
3.	a)	Construct Finite Automata for the regular Expression 1(01+10)*00?	(7M)
	b)	Show that $L=\{a^{2n}/n<0\}$ is Regular?	(7M)
4.	a)	Obtain the Chomsky normal form for the following grammar $E \rightarrow E+T/T$ , $T \rightarrow a/CE$ ?	(7M)
	b)	Construct a derivation tree for the string abcd from the grammar $S \rightarrow aAB, A \rightarrow bC, B \rightarrow d, C \rightarrow cd$	(7M)
5.	a)	Construct a PDA for $I = \{w \in W^R / w \in (0+1)^*\}$	(7M)
	b)	Construct a PDA for the following grammar	(7M)
6.	a)	Design a Turing Machine to recognize the language $\{0^n 1^n 0^n / n \ge 1\}$	(7M)
	b)	Discuss in brief about church hypothesis?	(7M)
7.	a)	What is decidability? Explain in brief about any two undecidable problems?	(7M)
	b)	Explain about Universal Turing Machine?	(7M)



www.FirstRanker.com

II B. Tech II Semester Regular Examinations, April - 2018 FORMAL LANGUAGES AND AUTOMATA THEORY (Computer Science and Engineering)         Max. Marks:         PART -A         1         0         Or struct a regular grammar for L= {0°11/n>=1}         (2M)         Or struct free grammar for the language {0°1°/n>=1}         (2M)         Define Unrestricted grammar?         (2M)          10	Co	de N	To: R1622055 (R16)	(SET - 4)
Note: 1. Question Paper consists of two parts (Part-A and Part-B)         2. Answer ALL the question in Part-A         3. Answer any FOUR Questions from Part-B         PART -A         PART -A         1. a) Define DFA?       (2M)         b) Construct a regular grammar for L= {0 <sup>n</sup> 11/n>=1}       (3M)         c) Write a Context free grammar for the language {0 <sup>n</sup> 1 <sup>n</sup> /n>=1}       (3M)         d) What is an instantaneous description in PDA?       (2M)         e) What is the purpose of studying Turing Machine?       (2M)         f) Define Unrestricted grammar?       (2M)         PART -B         2. a)       Construct Minimum state Automata for the following DFA ?         * denotes final state       (7M)         b) Explain in detail about Melay and Moore Machines?       (7M)         3. a)       Explain about the Closure Properties of Regular sets?       (7M)         b) Construct a NFA equivalent to the regular expression 10(0+11)0*1?       (7M)         4. a) Show that L={a <sup>n</sup> /n is prime} is Context free?       (7M)         b) Construct CNF for the Grammar S→ABC, A→0B	Tin	ne: 3	II B. Tech II Semester Regular Examinations, April - 2018 FORMAL LANGUAGES AND AUTOMATA THEORY (Computer Science and Engineering)	Max. Marks: 70
PART -A1. a) Define DFA?(2M)b) Construct a regular grammar for L= {0 <sup>n</sup> 11/n>=1}(3M)c) Write a Context free grammar for the language {0 <sup>n</sup> 1 <sup>n</sup> /n>=1}(3M)d) What is an instantaneous description in PDA?(2M)e) What is the purpose of studying Turing Machine?(2M)f) Define Unrestricted grammar?(2M)f) Define Unrestricted grammar?(2M)e) What is the purpose of studying Turing Machine?(2M)f) Define Unrestricted grammar?(2M)gPART -B2. a) Construct Minimum state Automata for the following DFA?(7M)* denotes final state $a_1 a_2 a_3 a_5 a_4 a_3 a_5 a_4 a_3 a_4 a_5 a_5 a_2 a_2 a_5 a_5 a_5 a_5 a_5 a_5 a_5 a_5 a_5 a_5$			<ul> <li>Note: 1. Question Paper consists of two parts (Part-A and Part-B)</li> <li>2. Answer ALL the question in Part-A</li> <li>3. Answer any FOUR Questions from Part-B</li> </ul>	
1. a)Define DFA?(2M)b)Construct a regular grammar for L= {0 <sup>n</sup> 1/n>=1}(3M)c)Write a Context free grammar for the language {0 <sup>n</sup> 1 <sup>n</sup> /n>=1}(3M)d)What is an instantaneous description in PDA?(2M)e)What is the purpose of studying Turing Machine?(2M)f)Define Unrestricted grammar?(2M)PART -B2. a)Construct Minimum state Automata for the following DFA ?* denotes final state $\frac{\delta}{2}$ $\frac{1}{42}$ $\frac{43}{43}$ $\frac{4}{43}$ $\frac{1}{43}$ $\frac{1}{4}$ $\frac{1}$			<u>PART –A</u>	
b) Construct a regular grammar for L= {0 <sup>n</sup> 11/n>=1} (3M) c) Write a Context free grammar for the language {0 <sup>n</sup> 1 <sup>n</sup> /n>=1} (3M) d) What is an instantaneous description in PDA? (2M) e) What is the purpose of studying Turing Machine? (2M) f) Define Unrestricted grammar? (2M) 2. a) Construct Minimum state Automata for the following DFA ? (7M) * denotes final state $\frac{\delta}{q2}$ $\frac{q3}{q4}$ $\frac{q3}{q5}$ $\frac{q2}{q3}$ $\frac{q5}{q5}$ $\frac{q2}{q5}$ b) Explain in detail about Melay and Moore Machines? (7M) 3. a) Explain about the Closure Properties of Regular sets? (7M) b) Construct a NFA equivalent to the regular expression 10(0+11)0*1? (7M) 4. a) Show that L={a <sup>p</sup> /p is prime} is Context free? (7M) b) Construct CNF for the Grammar S→ABC, A→0B, B→CD/0, C→1 (7M) 5. a) Construct a PDA for L={a <sup>n</sup> b <sup>n</sup> c <sup>n</sup> /n >0} (7M) b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M)	1.	a)	Define DFA?	(2M)
c) Write a Context free grammar for the language {0 <sup>n</sup> 1 <sup>n</sup> /n>=1} (3M) d) What is an instantaneous description in PDA? (2M) e) What is the purpose of studying Turing Machine? (2M) f) Define Unrestricted grammar? (2M) <b>PART -B</b> 2. a) Construct Minimum state Automata for the following DFA ? (7M) * denotes final state $\frac{\delta}{q2} \frac{1}{q2} \frac{1}{q3} \frac{1}{q5} \frac$		b)	Construct a regular grammar for L= $\{0^n 11/n \ge 1\}$	(3M)
d) What is an instantaneous description in PDA? (2M) e) What is the purpose of studying Turing Machine? (2M) f) Define Unrestricted grammar? (2M) PART -B 2. a) Construct Minimum state Automata for the following DFA ? (7M) * denotes final state $a = \frac{\delta = 0}{1}$ $a = \frac{1}{2}$ $a = \frac{2}{2}$ $a = \frac{2}{3}$ $a = \frac{2}{4}$ $a = \frac{2}{3}$ $a = \frac{2}{3}$ a =		c)	Write a Context free grammar for the language $\{0^n1^n/n \ge 1\}$	(3M)
<ul> <li>e) What is the purpose of studying Turing Machine? (2M)</li> <li>f) Define Unrestricted grammar? (2M)</li> <li>PART -B</li> <li>2. a) Construct Minimum state Automata for the following DFA ? (7M) <ul> <li>* denotes final state</li> <li><sup>δ</sup> 0 1</li> <li>4. a) Show that L={a<sup>p</sup> /p is prime} is Context free? (7M)</li> <li>b) Construct CNF for the Grammar S→ABC, A→0B,B→CD/0,C→1 (7M)</li> </ul> </li> <li>5. a) Construct a PDA for L={a<sup>n</sup> b<sup>n</sup>c<sup>n</sup> /n &gt;0} (7M)</li> <li>b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M)</li> </ul>		d)	What is an instantaneous description in PDA?	(2M)
f)Define Unrestricted grammar?(2M)EART -B2. a)Construct Minimum state Automata for the following DFA ? * denotes final state(7M) * denotes final state $a)$ $b$ $b$ $b$ $b$ $a)$ $a$ $a$ $a$ $a$ $a)$ $a$ $a$ $a$ $a$ $a)$ $b$ Explain in detail about Melay and Moore Machines?(7M)3. a) $b$ Explain about the Closure Properties of Regular sets? Construct a NFA equivalent to the regular expression $10(0+11)0^{+}1$ ?(7M)4. a)Show that $L=\{a^p / p \text{ is prime}\}$ is Context free? b)(7M)5. a)Construct a PDA for $L=\{a^n b^n c^n / n > 0\}$ b)(7M)b)Construct a PDA M equivalent to the following CFG S $\Rightarrow$ OBB, $B \Rightarrow$ OS/1S/0, test whether 010 <sup>4</sup> is in N(M)?(7M)		e)	What is the purpose of studying Turing Machine?	(2M)
PART - B2. a)Construct Minimum state Automata for the following DFA ? * denotes final state(7M) * denotes final state $a q 1 q 2 q 3 q 5$ $q 2 q 3 q 5$ $q 4 q 3 q 5$ $q 4 q 3 q 5$ (7M)b)Explain in detail about Melay and Moore Machines?(7M)3. a)Explain about the Closure Properties of Regular sets? to construct a NFA equivalent to the regular expression 10(0+11)0*1?(7M)4. a)Show that L={a <sup>p</sup> / p is prime} is Context free? to construct CNF for the Grammar S > ABC, A > 0B, B > CD/0, C > 1(7M)5. a)Construct a PDA for L={a <sup>n</sup> b <sup>n</sup> c <sup>n</sup> / n >0} to Construct a PDA M equivalent to the following CFG S > 0BB, B > 0S/1S/0, (7M)(7M)		f)	Define Unrestricted grammar?	(2M)
2. a) Construct Minimum state Automata for the following DFA ? (7M) * denotes final state $\hline 0 & 1 \\ \hline \hline q1 & q2 & q3 \\ \hline q2 & q3 & q5 \\ \hline \hline *q3 & q4 & q3 \\ \hline q4 & q3 & q5 \\ \hline \hline *q5 & q2 & q5 \\ \hline \hline & eq5 & q2 & q5 \\ \hline & eq5 & eq5 & q2 & q5 \\ \hline & eq5 & eq5 & q2 & q5 \\ \hline & eq5 & eq5 & q2 & q5 \\ \hline & eq5 & eq5 & q2 & q5 \\ \hline & eq5 & eq5 & eq5 \\ \hline & eq$			PART -B	
<ul> <li>b) Explain in detail about Melay and Moore Machines? (7M)</li> <li>3. a) Explain about the Closure Properties of Regular sets? (7M)</li> <li>b) Construct a NFA equivalent to the regular expression 10(0+11)0*1? (7M)</li> <li>4. a) Show that L={a<sup>p</sup>/p is prime} is Context free? (7M)</li> <li>b) Construct CNF for the Grammar S→ABC, A→0B,B→CD/0,C→1 (7M)</li> <li>5. a) Construct a PDA for L={a<sup>n</sup> b<sup>n</sup>c<sup>n</sup> /n &gt;0} (7M)</li> <li>b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M)</li> <li>construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M)</li> </ul>	2.	a)	Construct Minimum state Automata for the following DFA ? * denotes final state $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(7M)
3. a)Explain about the Closure Properties of Regular sets?(7M)b)Construct a NFA equivalent to the regular expression $10(0+11)0*1$ ?(7M)4. a)Show that L={a <sup>p</sup> /p is prime} is Context free?(7M)b)Construct CNF for the Grammar S→ABC, A→0B,B→CD/0,C→1(7M)5. a)Construct a PDA for L={a <sup>n</sup> b <sup>n</sup> c <sup>n</sup> /n >0}(7M)b)Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, test whether 010 <sup>4</sup> is in N(M)?(7M)		b)	Explain in detail about Melay and Moore Machines?	(7M)
b) Construct a NFA equivalent to the regular expression $10(0+11)0*1?$ (7M) 4. a) Show that L={a <sup>p</sup> /p is prime} is Context free? (7M) b) Construct CNF for the Grammar S→ABC, A→0B,B→CD/0,C→1 (7M) 5. a) Construct a PDA for L={a <sup>n</sup> b <sup>n</sup> c <sup>n</sup> /n >0} (7M) b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M) test whether 010 <sup>4</sup> is in N(M)?	3.	a)	Explain about the Closure Properties of Regular sets?	(7M)
<ul> <li>4. a) Show that L={a<sup>p</sup>/p is prime} is Context free? (7M)</li> <li>b) Construct CNF for the Grammar S→ABC, A→0B,B→CD/0,C→1 (7M)</li> <li>5. a) Construct a PDA for L={a<sup>n</sup> b<sup>n</sup>c<sup>n</sup> /n &gt;0} (7M)</li> <li>b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M) test whether 010<sup>4</sup> is in N(M)?</li> </ul>		b)	Construct a NFA equivalent to the regular expression 10(0+11)0*1?	(7M)
<ul> <li>b) Construct CNF for the Grammar S→ABC, A→0B,B→CD/0,C→1 (7M)</li> <li>5. a) Construct a PDA for L={a<sup>n</sup>b<sup>n</sup>c<sup>n</sup> /n &gt;0} (7M)</li> <li>b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M) test whether 010<sup>4</sup> is in N(M)?</li> </ul>	4.	a)	Show that $I = \{a^p / p \text{ is prime}\}$ is Context free?	(7M)
<ul> <li>5. a) Construct a PDA for L={a<sup>n</sup>b<sup>n</sup>c<sup>n</sup> /n &gt;0} (7M)</li> <li>b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, (7M) test whether 010<sup>4</sup> is in N(M)?</li> </ul>		b)	Construct CNF for the Grammar S $\rightarrow$ ABC, A $\rightarrow$ 0B,B $\rightarrow$ CD/0,C $\rightarrow$ 1	(7M)
b) Construct a PDA M equivalent to the following CFG S $\rightarrow$ 0BB, B $\rightarrow$ 0S/1S/0, (7M) test whether 010 <sup>4</sup> is in N(M)?	5.	a)	Construct a PDA for L= $\{a^n b^n c^n / n > 0\}$	(7M)
		b)	Construct a PDA M equivalent to the following CFG S $\rightarrow$ 0BB, B $\rightarrow$ 0S/1 test whether 010 <sup>4</sup> is in N(M)?	S/0, (7M)



www.FirstRanker.com

Co	ode N	No: R1622055 (R16)	SET - 4
6.	a)	Construct Turing machine for the languages containing the set of all strings of balanced paranthesis?	(7M)
	b)	Define Turing Machine? Explain about the Model of Turing Machine?	(7M)
7.	a)	Explain in detail about Halting Problem of Turing machine?	(7M)
	b)	Define LR(0) Grammar? Explain in detail about PCP?	(7M)

www.FirstRanker.com