Code No: R1622055 **R16** SET - 1

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**

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PART –A

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

PART -B

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

* denotes final state

δ	0	1
→ q1	q2	q6
q2	q1	q3
*q 3	q2	q4
q 4	q4	q2
q5	q4	q5
*q6	q5	q4

   b) Differentiate between NFA and DFA? (7M)

3. a) Construct a DFA for the Regular Language consisting of any number of a's and b's (7M)
   b) Explain about the identity rules of Regular Expressions? (7M)

4. a) Define Ambiguous Grammar? Check whether the grammar S→aAB, A→bC/cd, C→cd, B→c/d Is Ambiguous or not? (7M)
   b) Obtain GNF S→AB, A→BS/b , B→SA/a ? (7M)

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5. a) Show that for every PDA then there exists a CFG such that L(G)=N(P)? (7M)
   b) Construct a Turing Machine that will accept the Language consists of all palindromes of 0's and 1's? (7M)

6. a) Construct a Turing Machine to recognize the Language { $a^nb^nc^n/n>=1$} (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 example? (7M)

Code No: R1622055 **R16** 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**

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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 0011000using the grammar S→A0S/0/SS, A→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)	Design DFA for the following over {a,b}. i) All string containing not more than three a's. ? ii) All strings that has at least two occurrences of b between any two occurrences of a.?	(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→E+T/T, T→T*F/F, F→(E)/a ?	(7M)
5.	a)	Convert the grammar S→0AA,A →0S/1S/0 to a PDA that Accepts the same Language by Empty Stack?	(7M)
	b)	Construct a PDA for the following grammar S→AA/a, A→SA/b ?	(7M)
6.	a)	Design a Turing Machine for $L=\{0^n1^m0^n1^m/m,n>=1\}$	(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)

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Code No: R1622055 **R16** SET - 3

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**

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PART –A

1. a) Write about the applications of Finite Automata? (2M)
   b) If a Regular grammar G is given by S→aS/a Find DFA (M) accepting L(G)? (2M)
   c) Construct a Left most Derivation for the string 0011000using the grammar S→A0S/0/SS, A→S1A/10 ? (3M)
   d) $\{a^nb^nc^n/ n>=1\}$ 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 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→E+T/T, T→a/CE? (7M)
   b) Construct a derivation tree for the string abcd from the grammar S→aAB,A→bC,B→d,C→cd (7M)

5. a) Construct a PDA for L={wcw^R /w ε (0+1)*} (7M)
   b) Construct a PDA for the following grammar (7M)

6. a) Design a Turing Machine to recognize the language {$0^n1^n0^n$ / n>=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)

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Code No: R1622055 **R16** SET - 4

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**

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PART –A

1. a) Define DFA? (2M)
   b) Construct a regular grammar for L= $\{0^n11/n>=1\}$ (3M)
   c) Write a Context free grammar for the language $\{0^n1^n/n>=1\}$ (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 ? (7M)
   * denotes final state

δ	0	1
➔ q1	q2	q3
q 2	q3	q5
*q 3	q4	q3
q 4	q3	q5
*q5	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=$\{a^p$ /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=$\{a^n b^n c^n$ /n >0$\}$ (7M)
   b) Construct a PDA M equivalent to the following CFG S→0BB, B→0S/1S/0, test whether 010^4 is in N(M)? (7M)

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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)