Code: 15A05404 **R15**

B.Tech II Year II Semester (R15) Supplementary Examinations December 2018

FORMAL LANGUAGES & AUTOMATA THEORY

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define inductive proof.

(b) Differentiate NFA and DFA.

(c) Write the regular expression to denote a language L which accepts all the strings which begin or end with either 00 or 11.

(d) State the pumping lemma for regular language.

(e) If $\delta \to a\delta b/aAb, A \to bAa, A \to bAa, A \to ba$. Find the language generated by the grammar.

(f) Generate context free grammar L={w/w contain at least three a's}.

(g) What do you mean by instantaneous description for push down automata?

(h) Mention the normal forms of context free grammar. Justify the need of normal forms.

(i) Draw transition diagram of the tuning machine to recognize all strings consisting of an even number of 1's over Σ={1}.

(j) Distinguish between regular languages and recursively enumerable languages.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

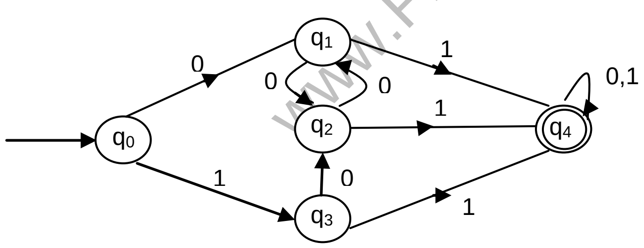
UNIT – I

2 Convert the following NFA to DFA.

	0	1
→p	p, r	q
q	r, s	p
*r	p, s	r
*s	q, r	¢

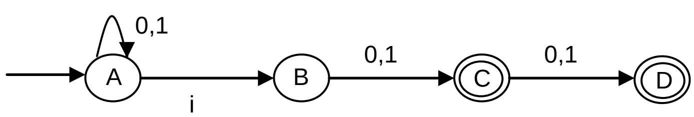
OR

3 Minimize the finite automaton shown in figure below.



UNIT – II

4 Convert the following NFA into regular expression.



OR

5 Summarize the closure properties of regular language.

Contd. in page 2

UNIT – III

6 Find the CNF of the following grammar:

$S \rightarrow 0A0|1B1|BB$

A→C

B→S/A

C→S/∊

OR

7 Show that the following grammars are ambiguous:

$S \rightarrow asbs/bsas/\epsilon$

$S \rightarrow AB/aaB, A \rightarrow a/Aa, B \rightarrow b.$

UNIT – IV

8 Let M=($\{q_0,q_1\}$, {0,1}, $\{x,z_0\}$, δ, q_0, z_0,¢) where δ is given by:

$\delta(q_0,0,z_0)=(q_0,xz_0)$

$\delta(q_1,1,x)=(q_1,\in)$

$\delta(q_0,0,x)=(q_0,xx)$

$\delta(q_1,\in,x)=(q_1,\in)$

$\delta(q_0,1,x)=(q_1,\in)$

$\delta(q_1,\in,z_0)=(q_1,\in)$

Construct a CFG for the PDAM.

OR

9 Show that the language $L=\{a^ib^ic^i / i\geq 1\}$ is not context free language.

UNIT – V

10 Define post correspondence problem. Let Σ = {0, 1}. Let A and B be the lists of three strings each, defined as:

	List A	List B
i	w_i	x_i
1	1	111
2	10111	10
3	10	0

Does this PCP have a solution?

OR

11 Design a Turing machine for multiplying two numbers using subroutine.

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