R.V.COLLEGE OF ENGINEERING, BANGALORE – 59.

Autonomous Syllabus, 2010.

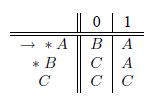
**Theory of Computation(10CS44)**

**Model paper 2**

**Exam Marks: 100 Exam Hours: 3 hrs**

**PART-A**

1. Describe the language accepted by the following DFA. (2M)



1. baa\*c denotes the set \_\_\_\_\_\_\_\_\_\_\_ (1M)
2. Write two differences between NFA and DFA (2M)
3. The automaton accepts (2M)



1. If L= {ab, aab, abab} the LR= (1M)
2. Pumping lemma for regular language states that (2M)
3. CFGs accepts all non regular languages (T/F) (1M)
4. Two Conditions for DPDA(2M)
5. Whether the following grammars is ambiguous or unambiguous (2M)

S🡪aS|bS|b

1. Non CFls are accepted by TM(T/F) (1M)
2. For ∑ ={0,1} ,design a Turing machine that accepts the language denoted by the regular expression 1\*001 (2M)
3. Transition function ∂ for TM with stay option is (2M)
4. Define CNF (2M)

**Part B**

1. a) Define a regular expression(RE). Write RE for the language consisting of the set of strings over alphabet {a,b,c} containing at least one a & at least one b. (08 M)
2. Design a DFA to accept the language L = { w: w has both an even no. of 0’s & an even no. of 1’s}. (08 M)

**OR**

1. a) Define i) Alphabets ii) Strings iii) Languages iv) Grammar (08M)

b) Find an NFA with 4 states for L = {an : n≥0}U{bna : n≥1} (08M)

1. a) State and prove Pumping Lemma(PL) for regular languages. (08M)

b) Minimize the states of the following DFA using table-filling algorithm. (08M)

δ 0 1

→A B A

B A C

C D B

\*D D A

E D F

F G E

G F G

H G D

**OR**

1. a)Define CFG, leftmost derivation, rightmost derivation, language of a grammar, sentential form, derivation tree, parse tree with example. (10M)

b) Design CFG for the following languages (a) L={0n1n : n≥1 } (b) {L=aibjck : i≠j or j≠k}.

(06M)

1. a) Define CNF & GNF, Useless productions, Unit productions, λ-productions. (08M)

b) Put the grammar with productions given below into CNF S→ASB│ε, A→aAS│a, B→SbS│A│bb. (08M)

**OR**

1. a) Define NPDA. Design a PDA to accept the language L = { aibjck : i+j = k, i≥0, j≥0}. Draw the transition diagram. (10 M)

b) Write a note on language accepted by PDA (06M)

1. a) Show that CFL’s are not closed under intersection (06 M)

b)Design a TM that accepts the strings of the form (10 M)

i) L={0n1n : n≥0} ii. L = { anbncn : n≥1}.

**OR**

1. a) Explain the techniques for simulating a TM by computer.

b)Design a TM that accepts the strings of the form x,y Є 1\* (10 M) f(x,y)= x+y if x-y=0

= 2x if (x-y)>0

=2y if (x-y)<0

1. a) Write short notes on (a) TMs with semi-infinite tapes (b) Multistack machines.(10M)

b) Prove that for every multitape TM there is an equivalent standard TM. (06M)

**OR**

1. a) What is meant by halting problem of TM? Explain the blank tape halting problem.

(08M)

b) Solve the PCP given below (08M)

List A List B

i wi xi

1 10 101

2 011 11

3 101 011