

SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme: B. Tech (Computer)
Batch : 2013-2014

Year: III

Semester: V

Academic Year: 2013-2014

Subject : **Theoretical Computer Science**

Date : 09/06/2014

Marks: 100

Time: 10.00 am to 1.00 pm

Durations: 3 (hrs)

Re-Examination

Instructions:- candidates should read carefully the instructions printed on the question paper and on the cover of the answer book, which is provided for their use.

NB: - 1) Question No **ONE** is compulsory

2) Out of remaining attempt **FOUR** questions,

3) All Questions carry equal marks.

4) Figures in brackets on right hand side indicate full marks

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- Q1.** A) Construct Post machine for Accepting Language $L = \{a^n b c^n \mid n \geq 0\}$. [8]
B) Prove that "If L is recursive, so is \bar{L} ". [7]
C) En-list and explain the limitations of Finite Automata. [5]
- Q2.** A) State and explain the pumping lemma for Context Free Language. [8]
B) Design a Mealy Machine for converting every sequence of "100" to "101" from the input string over a alphabet $\Sigma = \{0,1\}^*$. [8]
C) Write Regular Expression for the following languages (Any Two) [4]
i) Set of all strings containing "aa" and "bb" over $\Sigma = \{a,b\}$.
ii) Set of all strings containing atmost 3 a's over $\Sigma = \{a,b\}$.
- Q3.** A) Design Turing Machine to compute $\log_2 n$, where n is any unary number. [8]
B) Construct Push Down Automata for accepting even length palindrome over $\{0,1\}^*$. [8]
C) Show that every Regular Language is Context Free Language. [4]
- Q4.** A) Design Context Free Grammar for language L , such that L contains all binary strings equivalent to number divisible by 4. Give left-most derivation, right-most derivation and derivation tree for generating binary representation of twelve. [10]
B) Design Push Down Automata to accept $a^n (bdb)^n$. [10]
- Q5.** A) Design Deterministic Finite Automata for accepting all the decimal numbers divisible by 3. [10]
B) Show that $L = \{a^n b^n c^n \mid n > 0\}$ is Non-CFL. [10]

- Q6. A) Give Non-Deterministic Finite Automata with ϵ -moves for "a.a.(ba)*+b*.a.b.a*" [10]
B) Give Context Free Grammar for generating all the strings for the language [4]
 $L = \{w \mid w \text{ is an odd length string over } (a+b)^* \text{ with 'b' as a middle symbol}\}.$
C) Explain steps to remove ambiguity in grammar. [6]

Q7. Write Short Note (Attempt Any 4) [20]

- A) Turing Machine Codes. [5]
B) Un-decidable problems. [5]
C) Post Correspondence Problem. [5]
D) Pumping Lemma for Regular Language. [5]
E) Properties of Regular Languages. [5]
F) Elements of Post Machine. [5]

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